SCIENTIFIC AMERICAN

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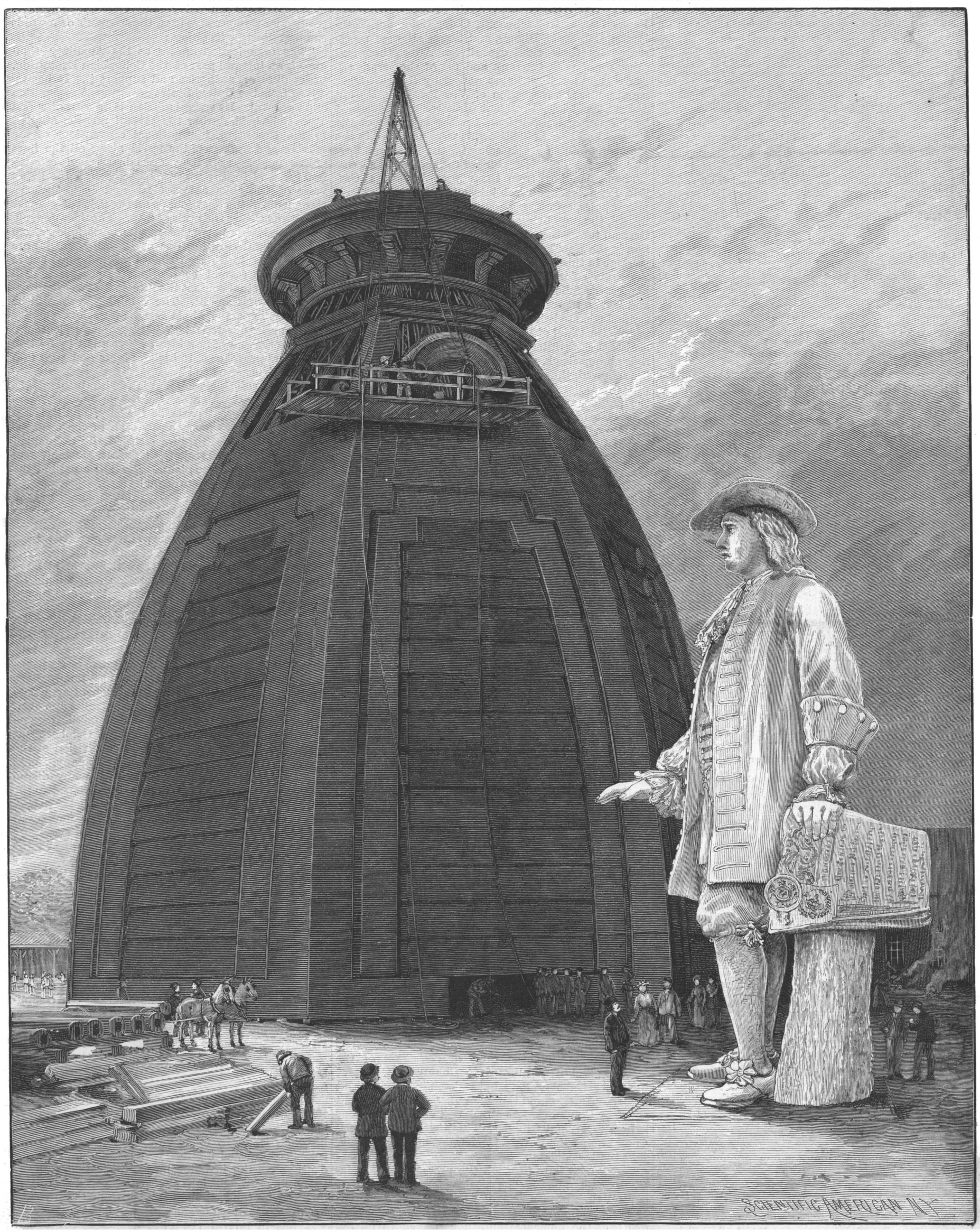

COLOSSAL STATUE OF WILLIAM PENN, AND DOME TO SURMOUNT THE CLOCK TOWER OF THE PHILADELPHIA PUBLIC BUILDINGS.—[See page 277.]

Scientific American.

ESTABLISHED 1845.

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NEW YORK, SATURDAY, OCTOBER 29, 1892.

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(Illustrated articles are marked with an asterisk.)

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No. 878.

For the Week Ending October 29, 1892.

Price 10 cents. For sale by all newsdealers

DEDICATION OF THE COLUMBIAN EXPOSITION BUILDINGS AT CHICAGO.

The twentieth and twenty-first days of the present month of October were the occasion of the dedication of the World's Fair at Chicago. On the first-named day the city was the scene of a civic parade which received universal encomium. Of the population of Chicago, it is computed that one in twenty participated in the parade. The number of visitors from the vicinity and from other places is computed at half a million. The total audience or body of spectators is estimated at twelve hundred thousand. In the parade there were seventy-five thousand participants.

Among the first in the civic parade came the Governors of the States with their escorts. Delaware, Pennsylvania, Massachusetts, Ohio, Colorado, Washington, California, Illinois, and Iowa, all were represented by their chief executives. After these and other dignitaries, the rank and file of the parade appeared, and for three hours passed by the reviewing stand under the inspection of Vice-President Morton and other officials, President Harrison being detained by his domestic affliction. On the east side of the Federal building 1,000 little girls were arranged in the shape and draped in the colors of the American flag, forming a very pretty feature of the occasion.

The Indian boys from the industrial school at Carlisle, Penn., excited much interest. They carried long yellow poles, on whose ends models of tools were attached, the boys being dressed in a gray uniform. The German turner societies, who attracted so much attention in the New York parade, figured also to great advantage in this one, in their gray coats and soft hats of the same color. A Scotch regiment, with bag-pipe band, were followed by Poles, Swedes, English, Irish, and Italian representative societies, almost every country and climate being represented. At the head of the parade the Chief of Police of Chicago, followed by the Assistant Superintendent and a number of inspectors, rode on horseback, and a detachment of mounted police followed, thus clearing the street for the parade proper. Major-General Miles was grand marshal of the parade, and he was escorted by a large body of aides-de-camp, many of them being officers of the regular army, but the majority appointed from civil life. Mayor Washburne, of Chicago, with the City Council and the Governor of the State, had as special escort the Chicago Hussars, in black uniform, with white trimming. The schools also participated in the parade to the extent of 2,000 boys, while the Catholic societies turned out in great strength.

In the evening there was a ball at the armory of the First Infantry, and a dinner was given to the distinguished visitors by the Fellowship Club; at it were present the Vice-President and other of the more prominent people.

The next day, the 21st, was the crowning day of all. It was marked by the formal dedication of the buildings and grounds of the World's Columbian Exhibition. The military parade opened the scene. This parade, less numerous than that of the preceding day, was very impressive, with its representatives of the regular army and of the volunteers from all parts of the United States. The troops assembled in the morning, and at 9 o'clock a start was made from the city for the Fair grounds. A long line of carriages, with escort, carried the different dignitaries, the list of whose names alone would exceed our space. Among them were included the Vice-President, United States cabinet officers, governors of States, members of Congress, judges of the United States Supreme Court, United States ministers, officials of the Fair, bishops and clergymen of different denominations, and many others.

At 1:45 in the afternoon the building was reached where the ceremony of dedication was to take place, the Manufactures building. Since early dawn thousands of people had been pouring into the great structure, as many as one hundred thousand being seated in it at once. Three hundred thousand people, it is estimated, passed in and out. About two o'clock the guests of the occasion began to appear upon the immense stage and in the seats allotted to them. A great chorus and band, including five thousand performers, supplied the musical part of the celebration. An invocation by Bishop C. H. Fowler, of California, opened the proceedings; it was followed by addresses by Director-General Davis, Mayor Washburne, Mrs. Potter Palmer, President T. W. Palmer, the National Commission, Vice-President Morton, and others. The Columbian oration, the *piece de resistance* of the speeches, had been allotted to Chauncey M. Depew, New York's great orator, who depicted in it the present aspect of America and the change in the world brought about by Columbus. As Mr. Depew concluded, about twilight, Cardinal Gibbons, of Baltimore, pronounced a prayer, and the Rev. H. C. McCook, of Philadelphia, gave the benediction.

Throughout the afternoon the proceedings were interspersed by music. The speakers found it, of course, beyond their powers to make themselves heard in so great a building. As described, it is said that a deep roar from the immense multitude seemed to fill the building at all times, swelling at times into a hoarser, louder sound and then dropping off. Even the music had difficulty in filling the enormous space.

One of the most impressive points in the celebration occurred in the evening at the Auditorium. Here the Columbian Congresses were inaugurated by Archbishop Ireland, of St. Paul. The immense auditorium was crowded. The proceedings were characterized by a benediction, spoken by Dr. William R. Harper, president of the new University of Chicago. Mrs. Potter Palmer pronounced a greeting from the woman's branch of the exposition, and Mrs. Henrotin pronounced a salutation in honor of Queen Isabella. Archbishop Ireland eloquently portrayed the great occasion, and stated the purpose of the World's Auxiliary Congress then being inaugurated. As this is really a most impressive idea, the speaker's own words can best describe its object:

"The organization known as the Auxiliary Congress is an integral part of the Columbian Exposition, whose directors authorize and support it. It has received from the United States government recognition and approval. Its special mission is to organize and cause to be held, during the several months allotted to the exposition, international conventions of the scholars and workers of the world along all the lines of human progress in the various departments of civilized life, and in this way present through the living voice of the chief actors clear and comprehensive statements of the questions in all the fields of activity which vex to-day the souls of men. The idea is truly grand, and most important results must follow from the successful carrying out of it. All countries are asked to send to Chicago their best and most active minds. The several conventions or congresses will bring into actual contact the leaders in the several departments of thought. The thinking world will be under our eyes, the whole trend of modern activity will be under our touch. What schools for learners! What workshops of new ideas, where mind in friction with mind provokes unto higher flights and rises into broader vistas of truth!"

The proceedings closed at night with brilliant displays of fireworks. Three identical programmes were rendered in different parts of the city, and it is believed that 200,000 persons saw each of the displays. One of the great features was termed the Columbian Bouquet, when 5,000 rockets, at the same instant, were sent up from the three places. For miles around the light of the 15,000 rockets could be seen.

Thus another scene in the world's commemoration of Columbus has passed. Before this epoch cities have welcomed their distinguished guests and have celebrated epochs in their history; entire countries have united in the commemoration of national events. The present year and the year 1893 sees the world at large united in an international celebration that should cement the bands that weld nations together, and should lead to some hope of universal peace.

TALKING ONE THOUSAND MILES.

The perfection of the science of long distance telephony has been going on for the past five or six years, until an epoch of much interest has finally been reached; that is the perfect transmission of articulate speech for a distance of one thousand miles and over.

We were invited to attend the first public demonstration of this fact on the afternoon of October 18, at the main offices of the Long Distance Division of the American Telephone and Telegraph Company, No. 18 Cortlandt Street, in this city, and with many distinguished lights in the electrical world listened to the distinct conversation that was carried on between that point and the main western office of the company at 105 Quincy Street, in Chicago.

About one hundred guests were assembled in the reception room when the president of the company announced that a cornet solo would first be transmitted from Chicago. Soon forty-one receiving telephones in New York gave forth every note of the distant instrument perfectly, then a funnel was attached to a receiver and the sound was heard by those standing near.

Mayor Grant was introduced and entered into conversation with Mayor Washburne, of the city of Chicago.

After the usual "Hello!" he returned the compliments of New York City, on the success of long distance telephony, but had some difficulty in hearing all Mayor Washburne said, because the latter read his speech and neglected to put his mouth close into the transmitter, but otherwise the transmission was perfect.

When Prof. Alexander Graham Bell, the inventor of the telephone, was introduced and sat down in front of the telephone and engaged in a conversation with his old friend, Mr. William G. Hubbard, in Chicago, a scene of unusual interest was presented, which evidently gave the inventor much satisfaction. Photography was brought into play at this point, recording, by means of the flash light, a picture of the inventor in the act of talking over a thousand miles of space.

It was in 1876, at the Philadelphia Centennial, in the presence of the Emperor of Brazil and Sir William

Thomson, that Prof. Bell first showed the operation of his telephone, having the same Mr. Hubbard as his assistant, who is also believed to be the first person that ever heard speech through the then new instrument.

At the conclusion of the formalities those present were accorded the privilege of testing the line personally. Through the courtesy of Mr. A. S. Hibbard, the expert operator, and Mr. F. A. Pickerneer, the chief engineer of construction, we were given an opportunity of trying the line, and conversed perfectly with Mr. Edward H. Lyon, the expert operator in Chicago, and with a representative of the western office of the SCIENTIFIC AMERICAN, Mr. G. M. Abbott. The most noticeable feature was the entire absence of all induction and perfect quiet of the line, also the sharpness or clear-cut quality of the words. The sound appeared to be fifty per cent less in volume than on short lines, but was otherwise as good.

On one side of the room was a long map showing the direction of the line from New York. It passes by cable under the North River, thence follows highways across the country through Newark, N. J., Easton, Harrisburg, Altoona, and Pittsburg, Pa., thence to New Castle, O., South Bend, Ind., and to Chicago. The line is built of two No. 8 hard-drawn copper wires carried along parallel with each other and transposed at certain intervals or crossed diagonally without touching, creating what is termed the electrical balance, which is proof against induction. There are forty-five poles to the mile, each 35 feet high, the total number being 42,750. The distance is 950 miles, and there are 435 pounds of wire to the mile, making a total weight in copper for the circuit of 826,500 pounds. An ordinary circuit for the same distance would weigh but 200,000 pounds. We were told the circumference area of the wire, if laid out to represent a flat surface, would cover 5 1-10 acres. The company have been but six months in building the extension of the line from Pittsburg westward, and will soon be able to connect Chicago with Milwaukee and other cities. Conversation has been carried on successfully between Chicago and Boston, a distance of about 1,200 miles.

It should be mentioned that an important element in the success of long distance telephony is the improved battery now used for energizing the transmitter, which has the merit of maintaining a nearly uniform electro-motive force of high tension for an extensive period of time. It is an improvement on the well known Fuller battery, and consists in using in the glass jar a solution of bichromate of soda and sulphuric acid, made as follows: Water, 10 gallons; commercial sulphuric acid, 25 pounds; and bichromate of sodium, 8½ pounds. In the bottom of the porous cup is placed mercury, an amalgamated zinc and a saturated solution of common salt. One large plate of carbon forms the other pole. A wood cover fits over the jar to prevent evaporation of the fluids. The outer solution, when fresh, has a light orange color. When exhausted, the solution changes to a dark olive green. It is called the "Standard" battery. Three cells are used to operate the transmitter, and were employed in making the test between New York and Chicago.

We were informed also that the long distance transmitter has been improved by using in it one uniform size of carbon granules, obtained by passing them through a sieve of a certain mesh.

The enterprise shown by the company in this great undertaking is worthy of all praise. It is a remarkable achievement, indicative of marvelous possibilities in the future, in an art still in its infancy.

The officers of the company are: John E. Hudson, president; E. J. Hall, vice-president; Melville Eggleston, secretary; W. R. Driver, treasurer.

Each invited guest was presented with a neat souvenir consisting of a spiral coil of the No. 8 copper wire flattened at each end, from which is suspended two miniature receivers. The words "New York" and "Chicago" are stamped on each end. Among those present at the Chicago office were George M. Pullman, Columbus R. Cummings, Professor John P. Barrett, and E. M. Barton. The rate for five minutes conversation between New York and Chicago is to be $9.

A New Comet Discovered by Photography.

A faint comet was discovered by Professor E. E. Barnard at the Lick Observatory on Wednesday night, October 12, by photography. Later visual observations show the comet to be about one minute in diameter. It is of the thirteenth magnitude, and is moving southeast 1 degree 40 minutes daily. Prof. Barnard, it will be remembered, lately discovered the fifth satellite of Jupiter.

Difficulties of Exactness.

Professor W. A. Rogers has constructed a standard yard and meter (62 degrees Fah.) upon polished steel. On one edge of the standard is a meter subdivided by 20 millimeters, and 60 inches subdivided to tenths of inches. Of the 400 tenth-of-inch spaces, 280 have errors not exceeding one twenty-five-thousandth of an inch.

POSITION OF THE PLANETS IN NOVEMBER.

JUPITER

is evening star. He retains his supremacy on star-lit November nights, while nothing in the line of a star exhibition is more brilliant than the celestial picture of which Jupiter is the central figure. The proof of this assertion will be apparent if we make a study of this superb planet on any evening when the moon is out of the way. If, for instance, we take the 18th, at a quarter past 8 o'clock. Jupiter on that evening makes his transit about 9 o'clock, and is nearly on the meridian at the time of observation. There are no bright stars in the immediate vicinity to detract from the splendor of the great magnate, but around him are grouped stars, constellations, and clusters that have called forth the admiration of observers ever since astronomy was young. Mars in lessening luster glows in the southwest, the brilliant Fomalhaut pays him homage from a point low in the south. The huge sea monster Cetus covers a wide range of sky well raised above the southeastern horizon, and presents to his notice Beta Ceti and Mira the Wonderful. Orion is rising in the east, the three stars in the belt being visible. Above them is Aldebaran, and still higher than the red star are the Pleiades. Cassiopœia is near the point overhead; below it is Perseus, with its demon star Algol. The lustrous Capella is on the left, while Castor and Pollux have arisen in the northeast. We omit the northern stars that are always visible, and note the brilliant Vega shining in the west, and Altair approaching the western horizon. Every observer may find the stars here mentioned, as well as enjoy the lovely picture of starry glory that the heavens reveal. The same picture may be seen on the 14th, at half past 8 o'clock, and on the 22d at 8 o'clock. Earlier in the month the same stars will rise later, and later in the month they will rise earlier, the stars rising four minutes earlier every evening on account of the movement of the earth in her orbit.

The moon makes two close conjunctions with Jupiter during the month. The first takes place two days before the full, on the second, at 6 h. 12 m. P. M., the moon being 21′ south. The conjunction occurs an hour and a half after sunset, when moon and planet will be so near as almost to form an appulse. The second takes place three days after the first quarter, on the 30th, at 0 h. 49 m. A. M., the moon being 38′ south. This conjunction is also visible, though the hour is less convenient for observation.

The right ascension of Jupiter on the 1st is 1 h. 7 m., his declination is 5° 23′ north, his diameter is 46″.9, and he is in the constellation Pisces.

Jupiter sets on the 1st at 4 h. 38 m. A. M. On the 30th he sets at 2 h. 32 m. A. M.

VENUS

is morning star. Her luster grows dim, her size decreases, and she rises at 3 o'clock on the 1st and at 4 o'clock on the 30th. These conditions are the palpable proofs that she is approaching the sun. The fairest of the stars has a planetary companion during November. Saturn is far enough from the sun to be easily visible. Venus, as she moves eastward toward the sun, encounters Saturn moving westward from the sun. The meeting or conjunction takes place on the 10th, at 2 h. 53 m. P. M., Venus being 31′ south. The planets are invisible at the time, but will be near together on the morning of the 10th. Venus is in conjunction with Spica on the 20th at 0 h. 37 m. P. M., being 4° 18′ north of the star.

The moon, four days before her change, makes a close conjunction with Venus, on the 15th, at 5 h. 7 m. P. M., being 14′ north. The conjunction is invisible, but waning moon and morning star will be near companions on the morning of the 16th.

The right ascension of Venus on the 1st is 11 h. 55 m., her declination is 2° 5′ north, her diameter is 16″.6, and she is in the constellation Virgo.

Venus rises on the 1st at 2 h. 58 m. A. M. On the 30th she rises at 3 h. 58 m. A. M.

SATURN

is morning star. He has emerged from his eclipse in the sunbeams, and takes a position of growing importance on November records. His conjunction with Venus has been described. He is very near the third magnitude star Gamma Virginis on the 12th at 11 h. 41 m. P. M., being 39′ south of the star.

The moon, four days before her change, is in conjunction with Saturn on the 15th, at 5 h. 16 m. P. M., being 23′ north.

The right ascension of Saturn on the 1st is 12 h. 31 m., his declination is 1° 0′ south, his diameter is 15″.1, and he is in the constellation Virgo.

Saturn rises on the 1st at 3 h. 46 m. A. M. On the 30th he rises at 2 h. 6 m. A. M.

MERCURY

is evening star. He reaches his greatest eastern elongation on the 23d, at 4 h. A. M., when he is 21° 52′ east of the sun. He is then visible to the naked eye, but his great southern declination will make him a difficult object to find, unless the observer has a practiced eye and excellent visual power.

The moon is in conjunction with Mercury two days after her change, on the 21st, at 8 h. 7 m. A. M., being 1° 6′ south.

The right ascension of Mercury on the 1st is 15 h. 27 m., his declination is 20° 26′ south, his diameter is 5″.0, and he is in the constellation Libra.

Mercury rises on the 1st at 5 h. 22 m. P. M. On the 30th he sets at 5 h. 34 m. P. M.

MARS

is evening star. He has finished his course through Capricornus, and entered Aquarius, and at the end of the month occupies nearly the same position in the heavens that Jupiter occupied on January 1. As Mars is moving eastward or in direct motion, and Jupiter is moving westward or retrograding, the planets will seem to approach each other during the month. Jupiter on the 1st is 48° northeast of Mars and 30° northeast of him on the 30th. Mars also is moving north, which brings him into better position for observation.

The moon on the day of the first quarter is in conjunction with Mars on the 27th at 0 h. 10 m. P. M., being 3° 34′ south.

The right ascension of Mars on the 1st is 21 h. 54 m., his declination is 15° 10′ south, his diameter is 13″.6, and he is in the constellation Aquarius.

Mars sets on the 1st at 0 h. 12 m. A. M. On the 30th he sets at 11 h. 46 m. P. M.

URANUS

is morning star.

The moon is in conjunction with Uranus, two days before her change, on the 17th, at 4 h. 3 m. P. M., being 0° 27′ south.

The right ascension of Uranus on the 1st is 14 h. 18 m., his declination is 13° 17′ south, his diameter is 3″.4, and he is in the constellation Virgo.

Uranus rises on the 1st at 6 h. 15 m. A. M. On the 30th he rises at 4 h. 26 m. A. M.

NEPTUNE

is morning star.

His right ascension on the 1st is 4 h. 37 m., his declination is 20° 29′ north, his diameter is 2″.7, and he is in the constellation Taurus.

Neptune rises on the 1st at 6 h. 30 m. P. M. On the 30th he rises at 4 h. 33 m. P. M.

THE OCCULTATION OF SATURN.

The moon occults Saturn on the 15th, the phenomenon being visible in this portion of the earth's territory. The immersion takes place on the 15th, at 3 h. 19 m. A. M., Washington mean time, and the emersion at 4 h. 8 m. A. M., the occultation continuing 49 m. There are six occultations of planets by the moon during the month, showing how nearly the moon's path coincides with that of the planets. Jupiter is occulted twice. Saturn, Venus, Uranus, and Mercury are each occulted once. Saturn and Venus are occulted on the same day. Our neighbor, the moon, therefore, contributes largely to the interesting incidents of the month.

Mercury, Mars and Jupiter are evening stars at the close of the month. Venus, Saturn, Uranus and Neptune are morning stars.

Lime Juice.

In a recent report the United States consul at Kingston gives the following description of the manufacture of lime juice in Jamaica:

The juice in its crude state is obtained either by running the limes through an ordinary cone mill, when the same is convenient and the fruit to be had in sufficient quantities, or by placing them in a squeezer especially adapted to the purpose, which seems to be the simpler and more usual plan.

To clarify the same requires straining and filtration, when some foreign substance is added to prevent decomposition of the vegetable matter, in which shape most of the juice is shipped from the island.

In order to concentrate, it is strained from the seed and pulp and placed in a copper battery and boiled on the same principle as sugar, care being taken not to scorch or burn it, as that destroys the acid. The more densely the juice is concentrated, the more valuable it is; but it is not advisable to go too far, as it burns easily without forming a crust on the copper. No iron vessel must be used, as the iron turns the acid black.

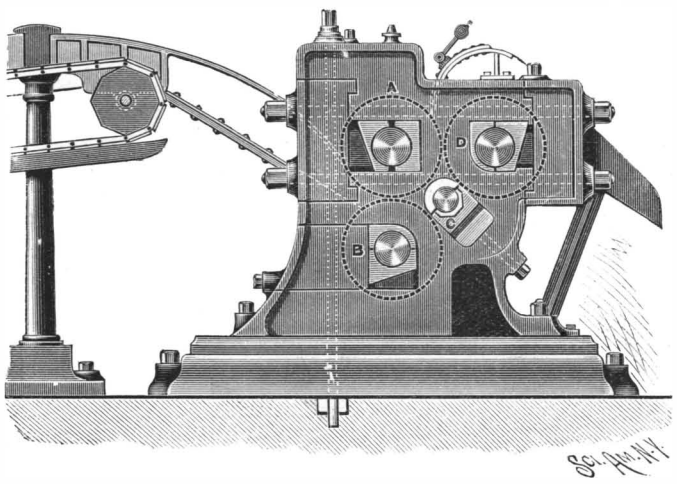
From the latest data (the year ended 31st March, 1891) the amount exported, which was doubtless about all that was made, was 53,884 gallons, of which 44,492 gallons went to the United Kingdom, 110 to Canada, and 9,282 to the United States.

The average valuation in the export list is 20 cents per gallon, but the price for the raw juice ranges from 18 to 30 cents, according to the supply and the demand, while the concentrated juice sells according to the percentage of citric acid it contains.

Substantially the same process is adopted in the manufacture of sour orange juice, which, when concentrated, I notice to be invoiced at from 45 to 50 cents per gallon; and 1,102 gallons, the entire amount manufactured during the period above stated, was exported to the United States.

AN IMPROVED SUGAR CANE MILL.

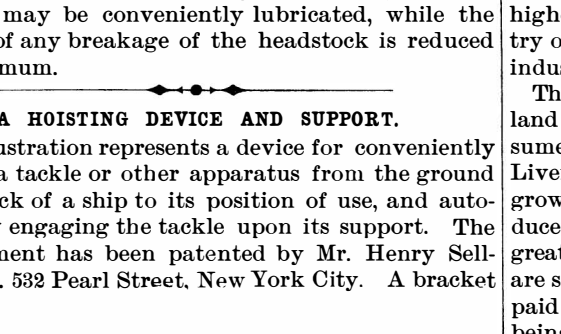
The cane mill shown in the illustration is designed to utilize the crushing power to the greatest advantage, without injuring the headstocks, the mill also proving very economical of power in comparison with the work done. It is said that one of these mills recently erected in the island of Barbados has proved a complete success extracting 71 per cent out of 100 pounds of cane, or very nearly equal to that ordinarily obtained by double crushing with two mills of three rollers each. The mill forms the subject of a patent recently granted to Mr. Donald Skekel, of Georgetown, Demerara, British Guiana. The two top rollers, A and D, are secured by horizontal bolts, which may be tightened up by means of nuts on their ends, and vertical bolts secure the lower roller, B, these bolts having collars on their lower ends and tightening nuts on their upper ends. In the headstock, opposite roller B, is a tongued and jointed removable piece, to facilitate removing the latter roller when desired without taking down the mill. The cane, after passing between the front or entrance rollers, A B, is passed up between the two top rollers, A D, the juice pressed out passing down by its own gravity and being conducted to a suitable receptacle. To guide the cane from the entrance rollers upward between the top rollers, A D, a corrugated roller, C, is driven by suitable gearing to travel at the same velocity as the other rollers, pushing the cane upward to undergo the final crushing. By means of a screw bolt with a nut on its outer end the corrugated roller may be adjusted to give the friction required to pass the partially crushed cane upward. Suitably arranged guides prevent the passing of the cane to the bearings of the rollers, and to prevent the bagasse from being carried over to the feeding side of roller A, a hinged hood is held in contact with the surface of the latter roller by a weighted lever. All parts of the mill are easy of removal, and the bearings may be conveniently lubricated, while the liability of any breakage of the headstock is reduced to a minimum.



SKEKEL'S SUGAR CANE MILL.

A HOISTING DEVICE AND SUPPORT.

The illustration represents a device for conveniently hoisting a tackle or other apparatus from the ground or the deck of a ship to its position of use, and automatically engaging the tackle upon its support. The improvement has been patented by Mr. Henry Sellheim, No. 532 Pearl Street, New York City. A bracket carrying a pulley is secured upon the top of the tackle support in such a manner that the pulley will be above the ring or eye of the support, both ends of a rope passing over the pulley being in the hands of an operator on the ground. A spring hook attached to one end of the rope is hooked upon the tackle hook, and the other end of the rope is passed through an eye on the outer end of a lever pivoted on this hook. As the tackle is then raised by pulling upon the rope, the tackle hook is readily manipulated to engage the eye of the support, while the lever pivoted on the hook may be made to close its open end, preventing the disengagement of the spring catch. When the job of hoisting has been finished, the tackle may in like manner be disengaged and lowered to the ground.



SELLHEIM'S HOISTING DEVICE.

Armour's Electric Railroad.

An elevated electric railway has been established at the stock yards at Chicago. It connects all the P. D. Armour warehouses and slaughter houses. There are, says the *Engineering News*, about 6,000 ft. now completed and about two miles of extensions are being built. The track has a gauge of 3 ft. and is 23 ft. above the ground. Where the line runs between the main buildings the structure is of steel; elsewhere it is of Georgia pine. The numerous switches necessary to reach all parts of the buildings made the construction difficult to plan satisfactorily. The ironwork was designed and erected by Mr. John Bouchard, master mechanic for the Armour Company. The electrical work was done by the Thomson-Houston Company, under the supervision of Mr. A. Shillinglaw, electrician for the Armour Company. There are in service two 20 horse power locomotives of the standard Thomson-Houston type. The cars may be run off the rails on to the floors of the different houses. The power house is located about a quarter of a mile from the road, and will be some distance beyond that when the company moves into the new electric station, occupying a building 125 by 150 ft., and comprising three stories, built of steel and brick, with the engines located on the first floor, shafting on the second and dynamos on the third. Current for the present equipment is supplied from a Thomson-Houston 135 horse power generator, and there is also ready for service a National 80 horse power machine.

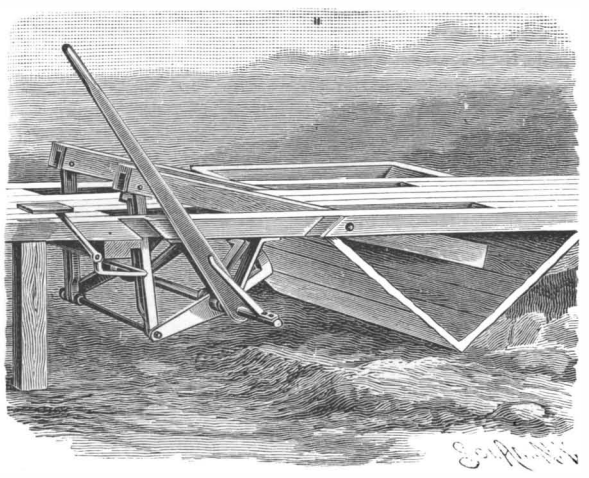
The World's Cotton Production.

The total crop of the world for 1891 is placed by one statistician at 12,570,000 bales, averaging 400 pounds weight. Of this the United States is credited with having produced 8,652,597 bales, averaging 480 pounds each, or more than three-fourths of the world's entire crop, in pounds. The East Indian product, of considerably less than a million bales, comes next. Egypt is third on the list. The average supply of the world's cotton for six years ending 1891 was 9,928,000 bales, of which the United States produced 7,659,000 bales, all other countries making only 2,269,000 bales. The acreage of culture is increasing more rapidly in the United States than in any other country. Until recently, Florida gave to the world the highest export of the sea island cotton, the most valuable of the cotton fibers, but during the year 1890-91 Georgia went highest, South Carolina coming next—the fruit industry of Florida having doubtless supplanted the cotton industry there.

The staple reaches its highest general price in England and on the Continent of Europe, where it is consumed by manufactures. The rates of freight to Liverpool from the different countries where the fiber grows usually determine the prices paid to the producer of the raw material. Planters living nearest the great shipping ports of our Southern and Gulf States are supposed to receive the very highest of all prices paid for the fiber—the lowest prices for good cotton being seen in South America and Asiatic localities where it is grown.—*Atlanta Constitution.*

AN IMPROVED GRAIN DUMP.

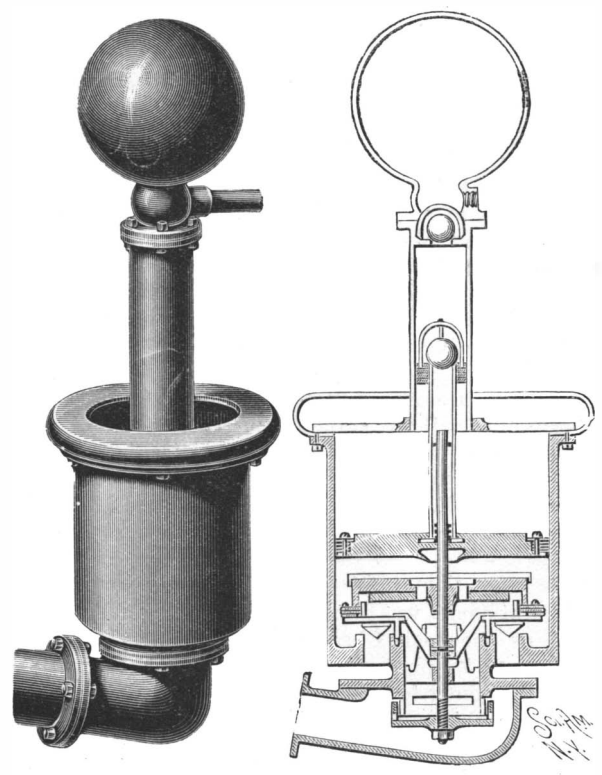
The illustration represents a simple, durable and inexpensive structure, so built that the pit to receive the grain need not be sunk into the ground, or may be sunk only a slight distance, while dust or foreign matter, fluid or solid, will not interfere with the action of the dump timbers in cold weather. The improvement has been patented by Mr. John P. Peterson, Worthington, Minn. The platform is mounted upon standards or other supports at the desired height from the ground, provision being made for readily driving upon and away from it; and in the platform, about the distance apart of ordinary wagon wheels, are lengthwise openings, in each of which a dump timber is pivoted. Beneath the platform are brackets in which is journaled a shaft under the rear ends of the dump timbers, and extending downward and rearward from this shaft are arms connected by a cross rod, the latter being pivotally connected by upwardly extending bars with the dump timbers. Latch links from the cross rod extend upward through the platform, these links being adapted to enter recesses by which the dump timbers are held in horizontal position. The connecting rods, links and dump timbers are practically counterbalanced by counterpoise weights on the shaft, from one end of which a lever extends up within a guard yoke on the edge of the platform, the lever being designed to engage oppositely inclined recesses in the side of the platform, the dump timbers being closed or in their horizontal position when the lever is in the rear recess and elevated when the lever is in the forward recess, a spring bearing against the outer face of the lever. Before the dump timbers can be elevated, the latch links must be released, which is effected by a lever having a foot plate on its upper end, after the vehicle is driven upon the platform, with its wheels on the dump timbers, the hand lever then being operated to incline the dump timbers and the vehicle, so that the contents of the latter will be deposited in the hopper.



PETERSON'S GRAIN DUMP.

AN IMPROVED HYDRAULIC RAM.

A simple and compact ram, by which water may be elevated to a considerable height by a stream having but a small fall, the water being discharged in a continuous flow, is shown in the accompanying illustration. The improvement has been patented by Mr. Lewis T. Webster, of Northfield, Mass. In the lower end of the inlet pipe is a valve with a central hub screwed on the lower end of a piston rod extending upward within a hollow interior piston rod or pipe, the lower end of the latter being screwed or otherwise secured to the top of a piston reciprocating in the large lower cylinder, around the bottom edge of which are the outlet valves. The interior pipe piston working in the central smaller pipe, or pump barrel, has at its upper end a check valve, and a ball valve rests in the passage from this pipe to a hollow casting at the top forming an air chamber, from a lower extension of which leads the outlet pipe. The water entering the ports of the valve at the bottom, both pistons being imperforate, flows up through the piston of the large lower cylinder, and into and through the interior pipe piston, entering also the smaller central pipe, or pump barrel, the water raising the large piston, and its upward movement carrying with it the interior pipe piston, forcing the water past the ball valve and into the discharge chamber. As the large piston reaches a point near the top of its cylinder, the central valve rod is raised, closing the inlet and opening the outlet ports, until the dropping of the large piston again opens the inlet and closes the outlet ports. Around the central valve rod is a spiral spring to prevent excessive shock in the working of the ram. The combined pressure from beneath and the air pressure from above are designed to cause the water to flow from the discharge pipe in a steady stream.



WEBSTER'S HYDRAULIC RAM.

A Marvel of Egyptian Antiquity.

The question of the irrigation of Lower Egypt is now, owing to the high Nile, attracting increasing attention. Under these circumstances it can hardly fail to interest our readers to have recalled to their minds the theory connected with the name of Mr. Cope Whitehouse, as to the locality of Lake Mœris. Briefly this was described by Herodotus, who wrote, moreover, of what he had himself seen, as a lake not far from Memphis (Cairo), some 450 miles in circumference, and fifty fathoms deep, full of fish of twenty-two species, used as a receptacle for the surplus waters of the Nile in flood, whence, when the Nile was low, sufficient water could be drawn to raise the river level again to the height required for the continued supply of Lower Egypt. Of this marvel of human ingenuity and industry Herodotus could find no words adequate to express his admiration, excelling, as it did, in his opinion, the Labyrinth, which again excelled all the Pyramids together, though any one of these was a match for the greatest works of Greece. Diodorus Siculus described the lake in almost similar terms, and Strabo, Pliny, and Mutianus all testified to its existence, while the Ptolemaic map gives a representation of it, not, indeed, indicating such enormous dimensions, but still indicating a vast body of water to the south and west of the Fayoum. Careful collation of all the old accounts enabled Mr. Whitehouse, as he thought, to fix the latitude and longitude of this abyss before he ever set foot in Egypt, and whether or not what he found was the site of the ancient Lake Mœris, this much is incontestable—namely, that he found a vast depression in the hills toward the Libyan desert, the depth and extent of which had never been suspected even by those who had tracked across it. This depression is known as the Wady Raiyan, and lies to the south and west of the modern province known as the Fayoum, from which it is separated by a narrow ridge. Herodotus described Lake Mœris as having its greatest length from north to south. This would be true of either the Fayoum or the Wady Raiyan separately (this latter having a singular prong of great length, called the Wady Muellah, stretching away toward the southeast), and it would be equally true if, as is probable from the dimension given, the lake covered both the Fayoum and Wady Raiyan together. If the entrance from the Nile Valley at El Lahun is not altogether artificial, the whole double basin was probably originally a great natural backwater for the water of the Nile in high flood. Mr. Whitehouse considers that the Fayoum was in great measure reclaimed when the Bahr Jusuf was made and dams erected at El Lahun, presumably between B. C. 1500 and 1800, and certainly not later than the Hyksos period; and in the name Bahr Jusuf, or Canal of Joseph, and the persistent Mohammedan tradition that the canal was made by the patriarch Joseph, he sees evidence that these great reclamation works were carried on during Joseph's premiership, and very likely in the main by the Israelites. There can be little doubt that Goshen, where they dwelt, was this district.—*London Saturday Review, September* 24.

Vanilla.

Notwithstanding the various preparations that have lately been put upon the market as substitutes for the vanilla for flavoring purposes, a great deal of attention is still directed to the cultivation of the plant and the preparation of the fruits for commercial purposes. Perhaps the most recent and formidable rival in the cultivation of vanilla is Fiji, from whence some good samples have more than once been received. The first consignment sent to London brought from the consignees a very congratulatory report on the prices realized, namely, 22s. 6d. per pound for three-fourths of the consignment and 21s. 6d. for the remaining fourth. The consignees further say that "unless the quality had been very satisfactory no such price could have been obtained, and if further consignments are up to the quality now sent in, we can say that Fijian vanillas will command a good price and a great sale. Speaking from an experience of nearly forty years, during which we have handled a considerable quantity of vanillas, we can unhesitatingly say that the quality of that sent here is equal to any vanilla grown in the Mauritius or elsewhere. The beans are plump and well cured, and are beginning to throw out splendid crystals. In future consignments it will be necessary to sort the vanillas and tin them according to lengths, and to take care not to pack the tins too closely."

In connection with the subject of the preparation of vanilla for market, one of the most striking departures from the ordinary mode of drying the pods seems to be that of keeping them moist, or rather wet, for some sample pods have recently been received in London preserved in alcohol. They are described as of fine appearance and good aroma, though, of course, partly exhausted by the action of the spirit, which, it has been suggested, will probably be sold with the beans. It is said that "by placing the pods in alcohol when freshly gathered, a much more fragrant tincture is obtained than by exhausting the cured beans purchased in Europe."

CONJOINED TWINS.

These new "Siamese Twins" do not come from Siam. They are natives of Orissa, in India, and the following description is sent to us by a correspondent, who saw them the other day in Poona. They are to appear, we believe, at the Aquarium, previous to fulfilling their engagement at the World's Fair, Chicago. The names of the children are Radica and Doddica. The two little girls are three and a half years old, and are really pretty children. The peculiarity of their connection is that there is a flexible bony attachment from breast to breast, and below this there is visceral connection. There is only one navel. If food is given to one the other is satisfied, and if medicine is administered to one the other is affected, but not to the same extent as the one to which it was given. The most curious circumstance is that when a sentence is begun by one child the other frequently finishes it. When sleeping, one child lies on her back and the other on her side, which gives an idea of the great flexibility of the connection. The children are very good friends, and seldom quarrel, but when younger their proceedings were not marked by that unanimity which they have since discovered to be essential to their circumstances. As might be expected, when their relations became strained there was considerable tension between them, but when it gradually dawned upon their

THE ORISSA TWINS.

(From a photograph.)

infantile intelligences that when one was hurt the other had to cry out of sheer sympathy, a mutual understanding was arrived at that "rows" should be discontinued, and now balmy peace reigns supreme. For their age, the twins are particularly intelligent. They have been taught English for the last three months, and, although they do not speak more than a few simple words, they seem to understand it fairly well already. The twins have excited a good deal of interest among the medical profession in India.—*Pall Mall Budget.*

Analysis of Coal Tar Preparations.

Messrs. Helbing and Passmore's latest investigation is on the valuation of disinfectants prepared from coal tar. In their report they state that, since the bactericidal properties of these preparations reside in the phenoloid bodies contained therein, the chemical estimation of such bodies is a measure of their activity, so that a bacteriological examination becomes unnecessary. Tar oils contain acids (so called), bases, and hydrocarbons which are more or less present in preparations made from them. A method of chemical analysis applicable to the one is, therefore, suited to the other within certain limits, which are laid down in the report. For determining the hydrocarbons (benzine, anthracene, naphthalene, and the like) the acids in 50 grammes or more of the oils are fixed and removed with 10 per cent caustic soda solution, the oils having first been diluted with an equal volume or more of ether. The ether dissolves the hydrocarbons and bases, and the small quantity of the latter, washed out by the soda, is also removed with ether from the alkaline liquors. The combined ethereal liquids are next washed with 1 to 4 sulphuric acid to remove bases, after which the ether is treated by washing and evaporation for hydrocarbons.

By fractional distillation the character of these may be studied and the bases may be estimated in the acid liquor by neutralizing with soda, evaporating to dryness, and extracting with spirit, whereby only the salts of the organic bases are dissolved out. The acid constituents of tar oils are phenol and its homologues. Strictly they are not acids, but they associate themselves readily with the soda in the preliminary treatment, and are to be sought for in the alkaline liquors. The process which Helbing and Passmore suggest for this is simple, viz., to acidify with sulphuric acid and extract the "acids" with ether, which, on evaporation, yields a residue of the phenoloid bodies. It is impossible, the authors say, to separate carbolic acid from its homologues by practical distillation, owing to the close proximity of their boiling points, and the only method which they found practicable was to fractionally precipitate the alkaline solution of tar acids with small quantities of mineral acid, whereby the carbolic acid is concentrated in the first fraction. So working they were able to satisfy themselves that Jeyes' fluid contains less than 0·25 per cent of carbolic acid and 48 per cent of other phenoloid bodies.

An Australian Scymnus Established and Described in California.*

BY C. V. RILEY.

The rapidity with which the Australian *Vedalia cardinalis* has established itself in California is familiar to every one. But the vedalia was not the only scale-feeding Coccinellid which was sent or brought over by Mr. Koebele on his first trip to Australia in 1888–89. Among others he brought several species of the genus Scymnus which, in due time, were set at liberty in the vicinity of Los Angeles. One of these, subsequently described by Dr. D. Sharp as *Scymnus restitutor* (*Insect Life*, I., p. 364), was lost sight of, while another much smaller species, originally collected by Mr. Koebele near Sydney, New South Wales (see Bull. 21, Division of Entomology, p. 24), turned up the present year in a rather amusing way. In the March number of the *Entomological News* (vol. iii., 1892, p. 51) Dr. F. E. Blaisdell describes a new Californian Scymnus under the name of *S. lophanthae*. He found it preying upon the San Jose scale (*Aspidiotus perniciosus*), which infested the limbs of *Acacia lophanthae* at the Coronado Parks near San Diego, in Southern California. It is a very inconspicuous species of reddish color, the thorax often having an indefinite dark spot on the disk, and the elytra being of a blackish bronze color. The last mentioned character is foreign to our native species of Scymnus, which never show any traces of metallic color, and, for this reason, I at once suspected, upon reading the description, that *S. lophanthae* was one of the species introduced from Australia. Upon comparing Dr. Blaisdell's description with the sample specimens sent by Mr. Koebele from his first and second trips to Australia, I had no difficulty in identifying *S. lophanthae* with the species from Sydney mentioned above. Subsequently Mr. D. W. Coquillett sent me a specimen recently captured near Los Angeles which fully confirmed this identification. Whether or not the species has been previously described from Australia, I have no special means of knowing; but it does not appear to be among those described by Mr. Blackburn in 1889 (Trans., etc., Royal Society, South Australia, xi., pp. 191–198). It is closely allied to *S. fagus* Brown, from New Zealand, and distinguished therefrom only by its finer and sparser elytral punctations and the greater extent of the pale thoracic color.

Dr. Blaisdell does not mention in his description the structural characters of the species, the more important of which are as follows: Prosternal lines long, straight, and converging slightly anteriorly; postmesocoxal line slightly reascending externally; postmetacoxal line complete, almost reaching the first abdominal suture; elytral epipleurae horizontal, reaching beyond third abdominal segment, slightly concave; inner marginal line not leaving the margin.

The beetle and its larvae are quite abundant in the Coronado Parks, according to Dr. Blaisdell; and since it also occurs near Los Angeles, there can be no doubt that this useful little Coccinellid has fully established itself in Southern California.

* Read at the meeting of the Association of Economic Entomologists, Rochester, August 17.

MacKey's Gang Sawmill.

This mill—the name of the inventor of which was inadvertently printed MacRey in our issue of October 15—is adapted for the cutting of lumber into bevel siding or boards, etc., by the addition of any of the ordinary feed motions, as well as the cutting of shingles. The mill is the invention of Mr. William T. MacKey, of Vancouver, British Columbia, and is being placed on the market by the MacKey Patent Gang Mill Co., of Vancouver, Toronto, and Canada.

A Railroad on Ice.

The communications between the two shores of the St. Lawence River at Montreal are made, as is known, by means of the Victoria tubular bridge, constructed some thirty-five years ago, which is the longest in the world, the metallic span being 6,500 feet long.

But from this point to the Atlantic, for a distance of 1,000 miles, there is no other bridge, and all the railroads established on both sides of the St. Lawrence have necessarily to cross it. The company of the Grand Trunk Railroad, which built it, levies a right of way toll of $10 per car and eight cents per passenger. To avoid payment of these moneys the S. E. Railway Co. had the idea, some ten years ago, of constructing in winter a communication between the two shores by means of a railroad established *on the ice*. Every winter the work is done over again, and it amply pays for the outlay. The length of this ice road is about two miles, between Hochelaga and Longueil. The roadway is easily built. The track leaves the main track parallel to the shore, then curves gradually in such a manner as to be perpendicular to it, and then, again, before it strikes the other shore, it curves anew so as to become nearly parallel to the opposite side, and then it is connected with the main track on this shore. Mr. Senical, the engineer of the line, constructed it as follows: Pine timbers, about 10 by 12 inches, and from 16 to 25 feet long, are placed like ties on the rough surface of the ice, being blocked so as to be horizontal in a direction perpendicular to the roadway by means of blocks of ice, and according to whatever grade may be adopted in the longitudinal props.

These long cross ties are placed at about 7 feet 3 inches from center to center, and they receive two parallel lines of longitudinal timbers of the same dimensions, 10 by 12 inches, distant also from each other in the length of the track of 7 feet 3 inches. Over these longitudinal ties, or stringers, and perpendicular to them, are placed, in the usual manner and at the ordinary distance from each other, the small cross ties used in railroad construction, to which are spiked the rails as it is customary. In this manner the rails are laid on a sort of crib, about 30 inches high above the level of the ice. No spokes, no joints of any kind, are used to fasten timbers or ties together, every piece of timber being merely laid down and blocked to its proper position or level with ice blocks. The whole crib is then filled with broken pieces of ice up to the level of the bottom of the rail, and this kind of ballasting is even made to project beyond the ends of the first timbers laid at bottom. Holes having been dug through the ice surface, the water of the river is pumped over the whole, and, in twenty-four hours or thereabout, a perfectly solid and compact track is obtained, over which trains can run. The thickness of the ice of the river in winter in these latitudes is never less than 16 inches, and this does not include the ice ballasting of the tracks. It is much more, if we refer ourselves to the preceding experiments, than is required to support any charge which can be placed upon it, specially if we consider that, from this mode of construction, each lineal foot of track corresponds to at least twenty-five square feet of ice to bear the load it may have to support. The same timbers can be used, of course, the following year.—*Ice and Refrigeration.*

Bright Streaks on the Full Moon.

In *Astronomische Nachrichten*, No. 3111, Professor Pickering gives a brief condensed account of the investigation that has been carried out at Arequipa with regard to the systems of bright streaks, especially round prominent craters, that are visible on our satellite at the period of the second and third quarters. The instrument employed was the 13-inch, and the magnification ranged from 450 to 1,120 diameters. The chief results noted were: (1) That the streaks of the systems round many of the large craters are not oriented to the center of the prime crater, but toward other craters whose dimensions are considerably smaller. (2) These minute craters are extremely brilliant, and rarely exceed one mile in diameter. (3) Some streaks are found to lie across or upon ridges; these are very seldom connected with small craters. (4) In the case of Copernicus, streaks are found to start from craterlets inside the rim and low up the inner side of the walls, and down the other side. The rim of Tycho also contains similar craterlets, but the streaks do not extend very far. (5) A difference in color was noticed between the streaks systems of Copernicus, Kepler, and Aristarchus, and those of Tycho, the last mentioned being considered whiter than the others. (6) There are no very long streaks; their general length may be reckoned from ten to fifty miles. What have been previously taken for long streaks are found, by minute observation, to be simply a series of these smaller ones connecting up, apparently, many small craters. That extending from the regions of Tycho across the Mare Serenitatis is so constructed. In seeking an explanation to account for the origin of these bright streaks, Professor Pickering suggests that if, for example, the craterlets on the rim of Tycho were constantly emitting large quantities of gas or steam, which in other regions was being absorbed, "we should have a wind uniformly blowing away from that summit in all directions." Should other craterlets in the vicinity "give out gases mixed with any fine white powder, such as pumice, this powder would be carried away from Tycho, forming streaks." This hypothesis, besides explaining the presence of the streaks themselves, satisfies very well the fact that they can only be seen after and before the first and last quarter of the moon phase, for it is only at this time that the contrast would be best seen.—*Nature.*

SCIENTIFIC NOTES.

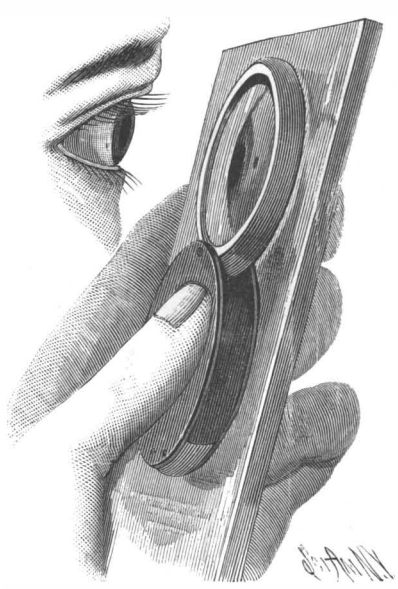
BY GEO. M. HOPKINS.

REMOVAL OF FOREIGN BODIES FROM THE EYE.

When a cinder, a piece of rock, steel, or other foreign substance gets into the eye the sufferer is desirous of being relieved as quickly as possible, not only on account of the pain and discomfort, but also on account of the apprehension of the object becoming more and more deeply embedded in the tissues, and the production of serious inflammation which accompanies any intrusion of this kind, and which is likely to last for some time after the removal of the foreign substance.

We are usually averse to allowing any one to meddle with our visual organs, especially when it involves anything akin to a surgical operation, so that if we can help ourselves when we meet with a misfortune of this kind, it is our pleasure to do so.

When the object is of such a size as to be readily visible in an ordinary mirror, persons with normal eyesight can easily locate it, and, in ninety-nine cases in a hundred, can remove it without aid by using a finely pointed pine stick, the extremity of which is moistened and bruised between the teeth sufficiently to destroy its rigidity and make it brush-like at the very point. Often the foreign body is so minute as to be undiscoverable by the means named, or the vision may be such as to necessitate the use of spectacles. In either of these cases the ordinary mirror will not answer; a concave or magnifying mirror is needed. This will show the object without using spectacles.



MAGNIFYING GLASS AND PLANE MIRROR USED AS A SUBSTITUTE FOR A CONCAVE MIRROR.

When the foreign substance consists of finely divided particles such as sand or dust, a wet camel's hair brush may be used to advantage. When the substance cannot be removed in either of these ways, the services of an oculist should be secured as early as possible. If the magnifying mirror is not available, a pocket magnifier having a diameter of 1 or 1¼ inches and about 2½ or 3 inch focus may be used in connection with an ordinary mirror, by placing the magnifier in contact with the face of the glass, as shown in the engraving.

AID TO VISION.

When age creeps on and vision fails so that eye glasses are essential to the close examination of near objects, it is vexatious when a person dependent on eye glasses finds his glasses have been left or lost just when they are needed most. If the light is strong, the angle of vision may be increased as the angle of the photograph lens is increased; that is to say, by the use of a diaphragm. The reading or seeing is to be done through a pinhole in a card, or better, in a piece of thick tin foil. The perforated card must be placed as near the eye as possible to secure the best results. It is not supposed that this device will take the place of glasses, but as a makeshift in an emergency it is valuable.

STOPPING LIGHT WITH TRANSPARENT GLASS.

One bright day, not long since, a reader of the SCIENTIFIC AMERICAN astonished a glazier by placing a few sheets of clear glass in such relation to each other as to almost entirely prevent light from passing through them, although the same panes of glass when piled together parallel with each other allowed objects to be clearly seen through them. This is how he did it. He placed 8 or 10 sheets parallel with each other and arranged them at an angle of 35° 25′ (the complement of the polarizing angle) with a given plane. Then he placed a similar bunch of the plates at the same angle with the plane at right angles to the first. In the first bunch of plates about one-half of the light was reflected to one side, while the remainder, which was polarized, passed on and was practically extinguished in the second bundle of plates.

A LESSON IN COMPLEMENTARY COLORS.

A gentleman whose power of observation is active recently retired in a room having white walls and ceiling and furnished with yellow window shades which were drawn down. He was awakened in the morning by the sunlight pouring in through the yellow shades. The walls and ceiling of the room appeared to him to be of a light green color. His explanation of this phenomenon was this: The light in passing through his eyelids was tinted red; by continual exposure of the optic nerves to red light they became tired, so that when the red screens (the eyelids) were removed by opening the eyes, the sensation of the complementary color was experienced, and as a result, the walls and ceiling appeared green. After gazing at the ceiling until the green color had vanished, he closed his eyes and covered them to prevent light from entering through the lids, when a vivid purple, the complement of the yellow or orange shades, was seen.

Hamburg Water.

BY JOHN B. COPPOCK, F.C.S., ANALYST TO THE LONDON WATER CO.

The spread of cholera at Hamburg has been one of the most noticeable points in the present cholera scare.

The connection between cholera and its diffusion in a polluted water medium has been strengthened and developed by many remarkable outbreaks extending over the last thirty years. The ravages of the disease have been shown to be coincident in time and space with the use of water from impure wells, the introduction of a pure and fresh supply bringing about the abatement of the outbreak.

Whether cholera can be produced by animal organic matters not of a specific nature has not yet been proved, but it has been proved that a polluted water supply is a splendid medium for the propagation of the cholera poison; anyhow, the endemic area of cholera approximates very closely to the area supplied with a polluted water.

By the kindness of a friend I have been enabled to get a sample of Hamburg water, taken from the mains by an ordinary tap, just as it is supplied for drinking purposes to the houses. The water gave the following results:

PHYSICAL EXAMINATION.

Appearance	Turbid, very yellow.
Taste	Slightly unpleasant.
Odor	Extremely small.
Deposit	Small, dirty looking.

MICROSCOPIC EXAMINATION.

Animal and vegetable matters ..... Inorganic particles.

QUANTITATIVE RESULTS (MEAN OF TWO ANALYSES).

Total solids	81·25	grains per gal.
Chlorine	33·04	"
Free ammonia	0·0746	"
Albumenoid ammonia	0·0205	"
Sulphates	2·37	"
Nitrates	1·95	"
Oxygen (consumed in 15 mins.)	0·065	"
" (consumed in 4 hours)	0·24	"

Cultivation in nutrient gelatine produced the usual crop of bacteria, bacilli, micrococci, and fungi, but the consumption of the water has not produced any choleraic symptoms in a cat. The water is very likely not specifically polluted, it producing a lowered state of the system and tendency to diarrhœa, favorable to the specific contagion. As the water is originally taken from the Elbe, it may with fairness be described as little short of "dilute sewage." The Senate of Hamburg is going to be asked to authorize the immediate construction of artesian wells for the production of a pure water supply—not too soon to take such steps in the present condition. A better water supply might have saved Hamburg from the present epidemic.—*Chemical News.*

Colors from Metals.

A thin, reguline, and coherent film of a metal transmits light of a color remarkably similar to that emitted by its incandescent vapor. The color of the vapor of a metal varies with the temperature. Just above its boiling point the vapor of sodium is purple; at incandescence, yellow. The vapor of potassium is green; at incandescence, violet. Silver in distilling gives off a blue-white vapor, while that volatilized by the electric arc passing between silver electrodes emits yellowish green light. The color of the film obtained in many cases agrees very well with that of the incandescent vapor. In some instances, however, there is no similarity, a fact which is probably due to failure to obtain the proper conditions for the volatilization and deposition. The perfection and continuity of the deposit is easily destroyed by very slight changes in the conditions.

The color of a film will vary somewhat with the thickness, but as far as I have observed the colors extend over a very limited portion of the spectrum. Each metal possesses a strong tendency toward a characteristic color, which is produced when the film is as thick as it can be to transmit any light.—*W. L. Dudley, in Am. Chem. Jour.*

THE STATUE OF WILLIAM PENN FOR THE PHILADELPHIA PUBLIC BUILDINGS.

We illustrated in our last issue the electroplating works for coating with aluminum the ironwork of the clock tower of the Philadelphia Public Buildings. The buildings occupy the block at the intersection of Broad and Market Streets of the city of Philadelphia. The north and south fronts are 470 feet long each; the east and west fronts are 486½ feet long, thus forming an almost square structure. In the center is an immense court, 200 feet square. Exclusive of this courtyard, an area of nearly 4½ acres is covered. Archways, 18 feet wide and 36 feet in height, one in the center and each side, give access to the court. The basement story, 18 feet 3½ inches in height, is of fine white granite. Above this, white marble from the Lee quarries, in Berkshire County, Mass., is the material.

From the north side of the courtyard the tower rises. For it to rest upon, a bed of concrete was laid 23 feet 6 inches below the ground; this mass is 100 feet square and 8 feet 6 inches thick. The tower proper is 90 feet square at the base and its walls are there 23 feet in thickness. They are built of dressed dimension stones, each weighing from two to five tons.

As the tower rises it falls off a little at each story and at the spring of the dome becomes an octagon, 50 feet in diameter. Below the dome is the clock, which will be one of the great clocks of the world. The face is 20 feet in diameter and the center, representing the axis of rotation of the hands, is 361 feet above the pavement, over 130 feet higher than the neighboring Masonic Temple on Broad Street.

Above the clock story of the tower rises the great iron and steel dome shown in our illustration, which, when coated with aluminum and weathered to the peculiar bluish tint acquired by the metal, will present a most striking object. Before erection it is put together at the Tacony Iron and Metal Co.'s works, where all fitting, drilling and other operations will be performed before it is transmitted to the site of its erection.

On the top of the giant structure the colossal figure of William Penn is to stand. This figure is in bronze, and represents the famous founder of Pennsylvania. The artist, A. M. Calder, designed to represent Penn in the full vigor of manhood. The face is a study from the original painting belonging to the Historical Society of Pennsylvania, to which it was presented by Penn's grandson, Granville Penn.

It represents William Penn at about 38 years of age, in the costume of the last years of the reign of Charles II. This was the period of his first visit to the colonies. As the building is a city building, not a State building, the endeavor was to represent Penn rather in his relations to the city than to the State; hence it is that his left hand rests upon a copy of the city charter. As far as it can be seen, the exposed page carries the seal, two feet in diameter, of Charles II. The characters upon the scroll are six inches long, and reproductions of the English characters used at that time in engrossing. The part disclosed reads as follows: "Charles II., King of England and France; defender of the faith. To all to whom these presents shall come 'Greeting.' Whereas our trustie and well beloved subject William Penn, Esquire, sonn and heir of Sir William Penn, deceased."

The statue is cast in about 50 pieces. They are secured together in the statue by bolts and rivets passing through inwardly projecting flanges, and the joints are so faced and tool-wrought as to be almost indiscernible. The weight is 52,400 pounds. It is 37 feet high and it stands 547 feet 3½ inches above the surface of the earth. Thus, with the exception of the Eiffel Tower, the figure could look over any building on the surface of the earth.

The following are the dimensions of the different elements of the statue:

Hat, 3 feet in diameter, rim 23 feet in circumference; nose, 13 inches long; eyes, 12 inches long and 4 inches wide; mouth, from corner to corner, 1 foot; face, from hat to chin, 3 feet 3 inches; hair, four feet long; shoulders, 28 feet circumference and 15 feet in diameter; waist, 24 feet in circumference and 18 feet 9 inches in diameter; buttons on coat, 6 inches in diameter; hands, 6 feet 9 inches in circumference, 3 feet in diameter, and 4 feet long; fingers, 2 feet 6 inches long; finger nails, 3 inches long; legs, from ankle to knee, 10 feet; ankle, 5 feet in circumference; calf of legs, 8 feet 8 inches circumference; feet, 22 inches wide, 5 feet 4 inches long.

Color in Plant Life.

Those familiar with the growth of flowers, says the *Horticultural Times*, know how essential light is to the creation of color. The most gaudy blooms and the most brilliant foliage, if kept in the dark or overshaded, will become pale and almost white. This fact shows the presence in the plant of some chemical agent which is acted upon by the actinic rays. To some extent this chemistry of nature is understood by florists, who, by the use of chemical manures and other means, strive to take the greatest advantage of it. For instance, it is a common practice to mix alum and iron filings with the soil in which certain plants are grown, in order to bring out special colors. The bluish-tinted hydrangea is the result of such treatment. Salts of iron, or sodium phosphate, added to the soil turn the crimson of the peony to violet, and produce blue hortensias.

According to Dr. Hansen, who has studied the subject very closely for many years, there are only three distinct pigments to be found in flowers—setting aside the chlorophyl, which forms the green coloring matter in all plants. These colors are yellows, reds, and blues. The yellows are mostly in combination with the plasmic sap, while the others exist chiefly in solution in the cell sap. The yellow pigments form an insoluble compound with fatty matters, which is termed lipochrome. Orange is formed by a denser deposit of the yellow, and the color in the rind of an orange is identical with that found in many flowers. The red in flowers is a single pigment soluble in water, and decolorized by alcohol, but capable of being restored by the addition of acids. Lipochrome combined with this red pigment produces the scarlets and reds of poppies and of the hips of hawthorns, but the varying intensity of reds in roses, carnations, peonies, and other flowers depends on the presence of a greater or a lesser quantity of acids. The blue and violet colors are also decolorized by alcohol, but are reddened by acids. Florists have already succeeded in producing a very large scale of unusual colors in flowers, and there seems to be very good grounds for believing that it is possible so to manipulate nature that she will produce blossoms of every conceivable tint.

The Introduction of Wire Rope.

J. E. EMERSON.

The pick and shovel are the first necessary implements for the construction of a railroad. Then the rolling mill is necessary for the production of the rails, and the locomotive is the masterpiece of combined ingenuity and exquisite workmanship and genius all represented in this masterpiece. Capital is just as essential as any element in order to construct this modern highway for the rapid conveyance of the vast products of productive industries. Inherited capital rarely engages in manufacturing enterprises. Manufacturers are usually workmen who, by their perseverance and study, first became the directors of others and assumed the higher positions, and thereby attained mastership and proprietorship or part ownership in the plant.

A neighboring German of quite advanced age and quite wealthy, a few months ago was relating to me a most singular event which ended in a most glorious triumph of success. Said he: "One day a rather tall German entered my office and inquired if I was the proprietor of the wire mill. I replied that I was. Said he: 'I am looking for wire to make a wire rope.' 'A what?' said the gentleman. 'A wire rope,' said he, taking from his pocket a piece a few feet long and the size of a small finger. I took it and examined it. It was very flexible, and he told me its strength, and the rather surprised me. I said, 'Yes, we can make wire like that;' and gave him the price per ton. He then Said I have a conditional order for a wire rope of several tons weight to be used drawing coal out of a mine in Schuylkill County, this State (Pennsylvania), but they are cautious, and want to use it six months before paying.' 'Well, yes,' said I, 'we can furnish you the wire; but, as you are a stranger to us, we would want some assurance that we will be paid.' 'Well,' said the honest-looking German, 'I cannot give you any, for I am not worth a dollar in the world, and, if the rope fails, I don't suppose I can ever pay you; but I am confident it will not fail, and I will make you this proposition: You see I get a large price for the rope, and it will cost me as much to make it as for you to furnish the wire; and, if this succeeds, it will open a field for an immense business in wire, and I think you can afford to take part of this risk with me.' I then went and consulted my partner in business, and, after a short time, we said, 'Leave your order. We will accept it on your terms.' We made the wire, and he the rope. It proved a success and we got our money at the end of six months, and we sold that man more than two hundred thousand dollars' worth of wire for wire rope before he got to making it himself."

That German I was well acquainted with, and he died worth over a million and a half, and left his business and fortune to his family. I do not feel at liberty to give the names of these parties, but they have a great reputation in suspension bridge building, second to none on earth. It sometimes takes several generations to practically develop a discovery. When Franklin sent up his kite and bottled the first lightning, no person on the earth then could have conceived what was to come. Professor Morse was not then born, and when he sent the first message from Washington to Baltimore, "What hath God wrought!" Edison was not born. The arc and incandescent lights were away in the distant realms of darkness, and to propose to use it as a motive power for propelling street cars and now railroad locomotives would in Franklin's time have been classed as Salem witchcraft. And no doubt air ships will yet be propelled by electricity and passengers will cross the Atlantic by it.

Inventors, if you have little or no means and desire success, invite capitalists to assist you. And capitalists, if you wish to employ your surplus to benefit the world, use part of it to aid the honest inventor. And, mechanics and workmen, if you desire employment for your support, don't fight genius or capital, but help them. Don't envy the man his wealth, but encourage its accumulation in every way possible. These three great elements, capital, labor, and genius, should go hand in hand.

The Solubility of Phosphoric Acid.

Prof. Norman Robinson, State chemist of Florida, has made some interesting experiments on the solubility of the phosphoric acid of Florida phosphates in different solutions. The rock taken for the experiment was a typical sample of hard rock phosphate, containing 74·80 per cent phosphate of lime, 3·20 per cent ferric phosphate, and 2·89 per cent phosphate of alumina. When treated by the usual method, with neutral ammonium citrate, this gave 2·43 per cent available phosphoric acid. In preparing the sample for the various solvents, one gramme of rock was ground with an equal amount of each of the solvents and carefully rinsed into a beaker, where sufficient water was added to bring the volume to 100 c. c., a cover was placed over it and the beaker set aside. In the cases of using potassium hydrate and quicklime as a solvent the materials were placed in a bottle and carefully sealed to exclude air.

The chemicals used as solvents were muriate of potash, containing 93·21 per cent potassium chloride, kainit, containing 23·46 per cent potassium sulphate, with the usual proportions of calcium and magnesium sulphates and sodium chloride; sulphate of potash, containing 94·06 per cent sulphate; commercial flowers of sulphur; caustic potash and nitrate of potash. A check was made for the solvent power due to water alone. After standing five months the samples were opened and the following solvent power of each one determined:

	Phosphoric acid. Per cent.
Pure water alone dissolved	0·64
Water and muriate of potash	0·58
" " kainite	0·48
" " sulphate of potash	0·46
" " flowers of sulphur	0·45
" " caustic potash	1·19
" " nitrate of potash	0·48
" " caustic lime	0·00

Professor Robinson states that these experiments have been made in answer to many queries received by him as to the solvent power of the salt given. From the results shown he infers that neutral salts retard the solution of phosphoric acid in water and caustic lime absolutely prevents it, and he recommends that caustic lime should not be applied to ground at the same time with phosphoric manures.

Personal.

Mr. J. M. Allen, for twenty-five years the president of the Hartford Steam Boiler Inspection and Insurance Company, was recently the recipient of a handsome testimonial from his associates and the officers of the company, on the completion of the quarter of a century in his office. It consisted of a very rich service of 101 pieces of silver, together with an album of autograph tributes of friendship and esteem, illuminated in Tiffany's best style, both the service and the album being noble specimens of choice workmanship and exquisite design. The manner of presentation, too, was quite out of the ordinary, Mr. Allen being hastily summoned home while absent on his summer vacation to find a genuine surprise party assembled in his house at Hartford for the purpose, not a whisper of their intention having previously reached the ears of the recipient.

Improved Armor Plates.

At a recent meeting of the Franklin Institute, Philadelphia, Mr. F. Lynwood Garrison gave an account of some recent trials of Harveyized nickel steel armor plate, made by the Bethlehem Iron Company, of Bethlehem, Pa., and tested on the private proving grounds of the company. The results of these trials demonstrated a decided advance in the resisting powers of such plates to the penetration of projectiles. Photographs of these plates taken after the firing test (five shots from an 8-inch gun, powder charge 81¼ pounds. Holtzer projectile weighing 250 pounds). Referring to the last experiment, the speaker stated that the plate (8 by 6 feet by 10½ inches thick and weighing 18,600 pounds), which was a companion piece to one that had lately been tested at the Indian Head proving ground, of which trials a full account appeared in his report published in the *Journal*, had received a total energy of impact of 25,040 foot tons, fully 50 per cent greater than the plates were subjected to in the previous trials, and exhibited, nevertheless, much less injury than the plates in the former tests. He considered it doubtful whether armor plates equal in quality to this had ever been produced elsewhere.

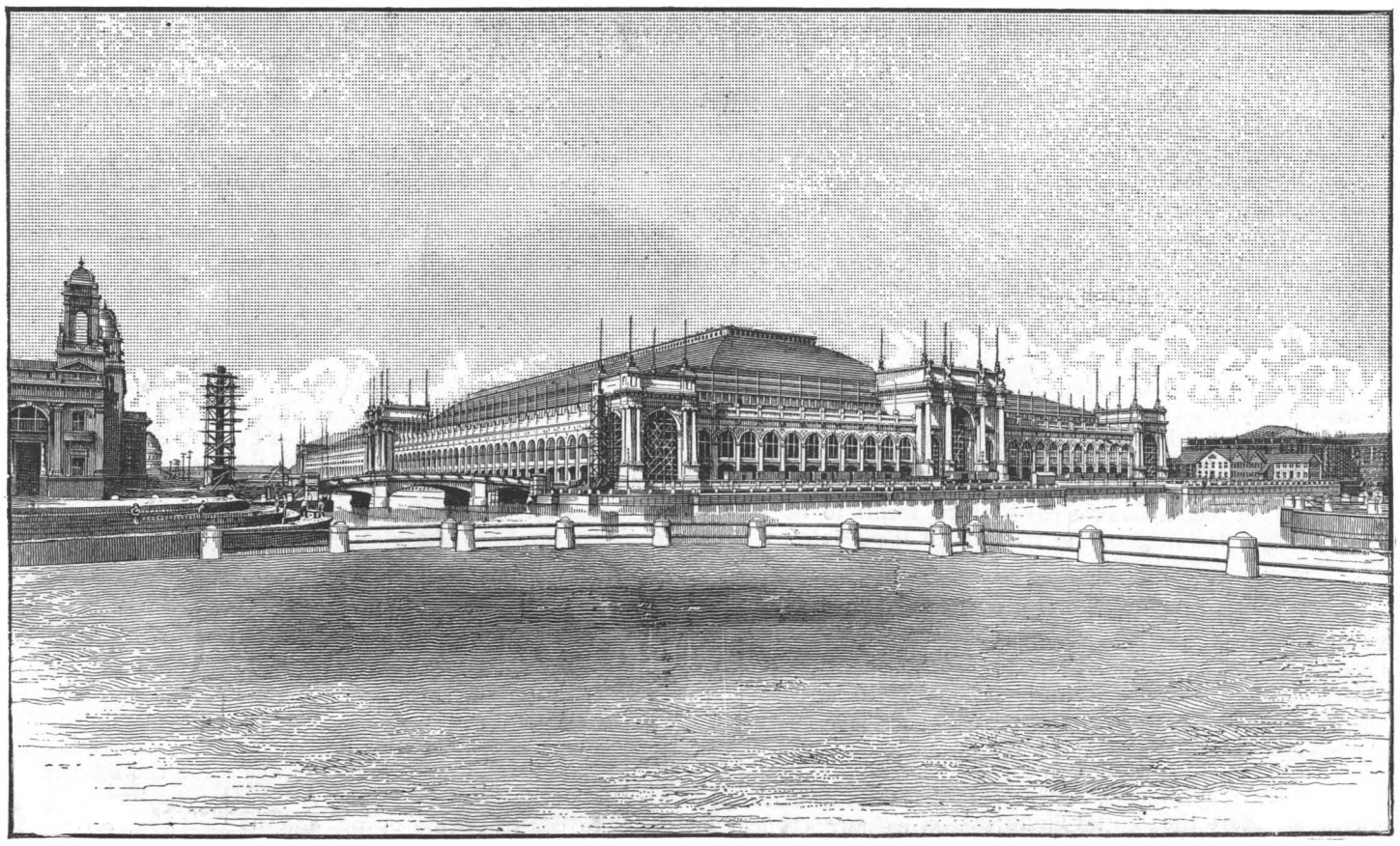
THE LIBERAL ARTS BUILDING.

The impressive ceremonies which took place on the 21st of October within the walls of the Industrial and Liberal Arts Building, at the World's Columbian Exposition, mark an important period in the rapid history of this wondrous enterprise. That so fine a structure, of such marvelous dimensions, could have been erected in so short a time and thrown open for the reception of so great a multitude, is simply astonishing. It is estimated that 100,000 people were present, the largest assembly, probably, ever brought together under one roof in the history of the world. If every part of the building were occupied, and if we were to allow a superficial area of 3 feet for each person, no less than 400,000 people could be brought together. We are told of Roman amphitheaters that were large enough to seat 250,000 spectators; but these edifices were not roofed over, and the construction easy and simple, as compared with this great palace of to-day.

We give an exterior view of the great building, which has been prepared from a recent photograph, and present an engraving, also from a photograph, which will convey a general idea of the mode which was adopted in the erection of the great girders which form the framework and support the roof of the immense structure.

The estimated cost of the building is over one million dollars. The area under roof is a little over thirty acres. It is located near the shore front and adjacent to the great basin, as seen in our illustration. The central hall is 1,268 feet in length, 368 feet in width, height 206 feet 4 inches. The roof is supported on eighteen great trussed girders, the general form of which is shown in our engraving. The trusses are hinged on the bed plates and also the apex. Longitudinal girders of great size connect the trusses. The material used is steel, the contract calling for the use of the best materials, subject to severe tests. Contractors, the Edgemoor Bridge Works, Wilmington, Delaware

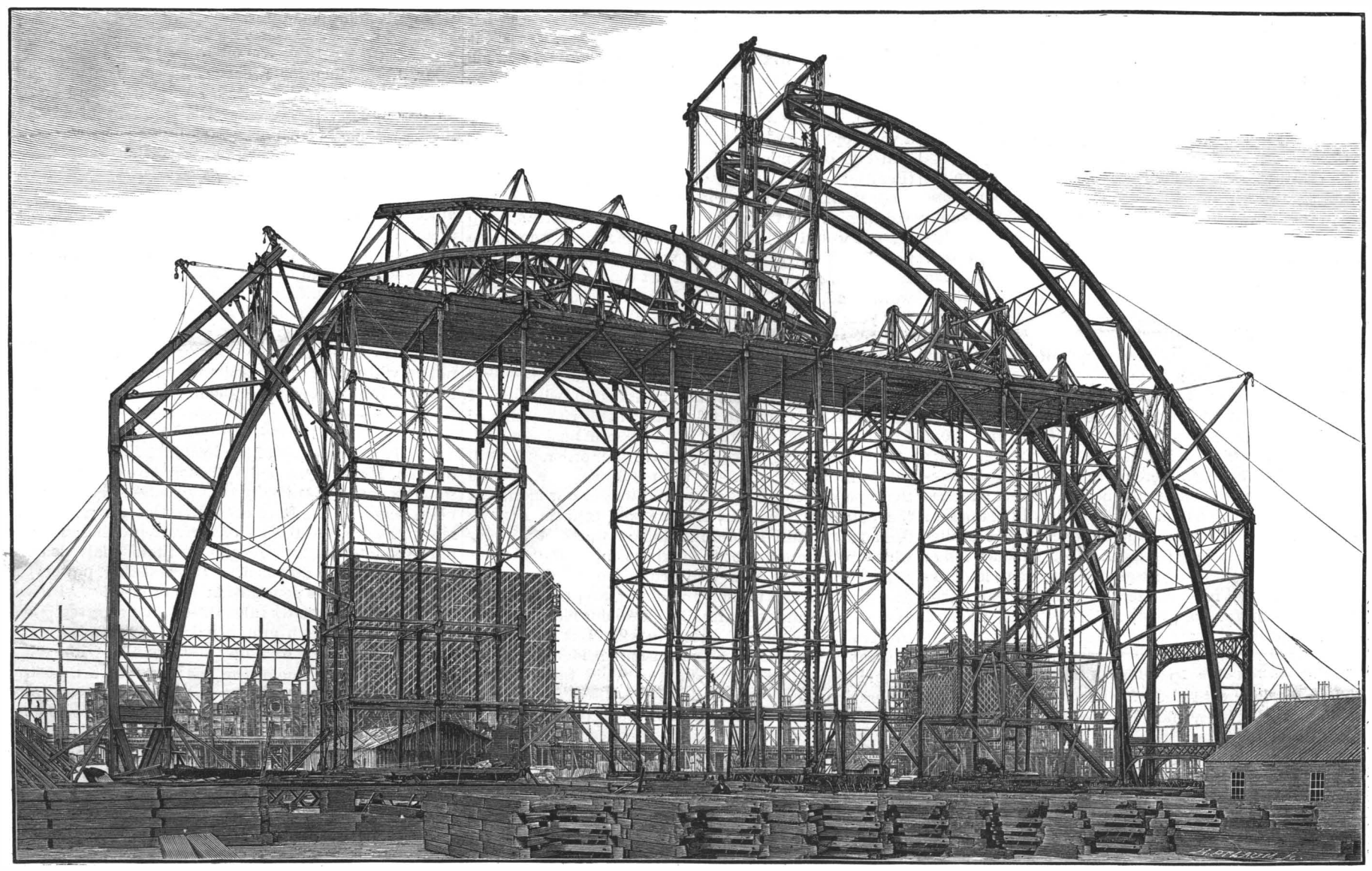
In the erection of the building three tower-like stagings were used. Mr. D. H. Burnham, chief of construction, was the designer of this great work, and it is due to his genius and remarkable energy that such extraordinary progress has been made.



THE WORLD'S COLUMBIAN EXPOSITION—MANUFACTURES AND LIBERAL ARTS BUILDING LOOKING NORTH FROM THE SOUTHWEST CORNER.

A Gigantic Meteorite.

A very large meteorite was found about 1860 near Bacubirito, Mexico. Its length is 11·65 feet; height, 5·25 feet; width, 4·35 feet; weight, 25 tons. According to the Chicago *Inter-Ocean*, the meteorite remained undiscovered by the whites until a recent date. Specimens were polished and etched, and showed the well known Widmannstattian figures. The Indians paid many visits to the huge meteorite for purposes of worship. An attempt was made to secure the meteorite for the Chicago Exposition, but it was unsuccessful, though permission to make a cast was obtained. The reason of the failure appears to have been the unwillingness of the government of Mexico to allow the specimen to go out of the country.



THE WORLD'S COLUMBIAN EXPOSITION—ERECTION OF THE GREAT ROOF TRUSSES, LIBERAL ARTS BUILDING.

A NEW ELECTRIC LAUNCH.

The electric launch Vashti lately made a very successful trip on the Hudson River, running from Nyack to Sing Sing and return.

The party on board consisted of a number of well known newspaper men and electricians, who were unanimous in their opinion that this system of electric propulsion was all that could be desired.

The whole operation of the boat is under control of one person, and simple in the extreme.

The starting, stopping, and reversing is regulated by a single wheel, and any speed, from the maximum to zero, can be obtained by turning the wheel, as when moved to the right the propeller starts ahead, and the farther it is moved to the right the faster the propeller goes; on turning this wheel back to the starting point the motor comes to a standstill, and on turning it to the left the motion of the propeller wheel is reversed.

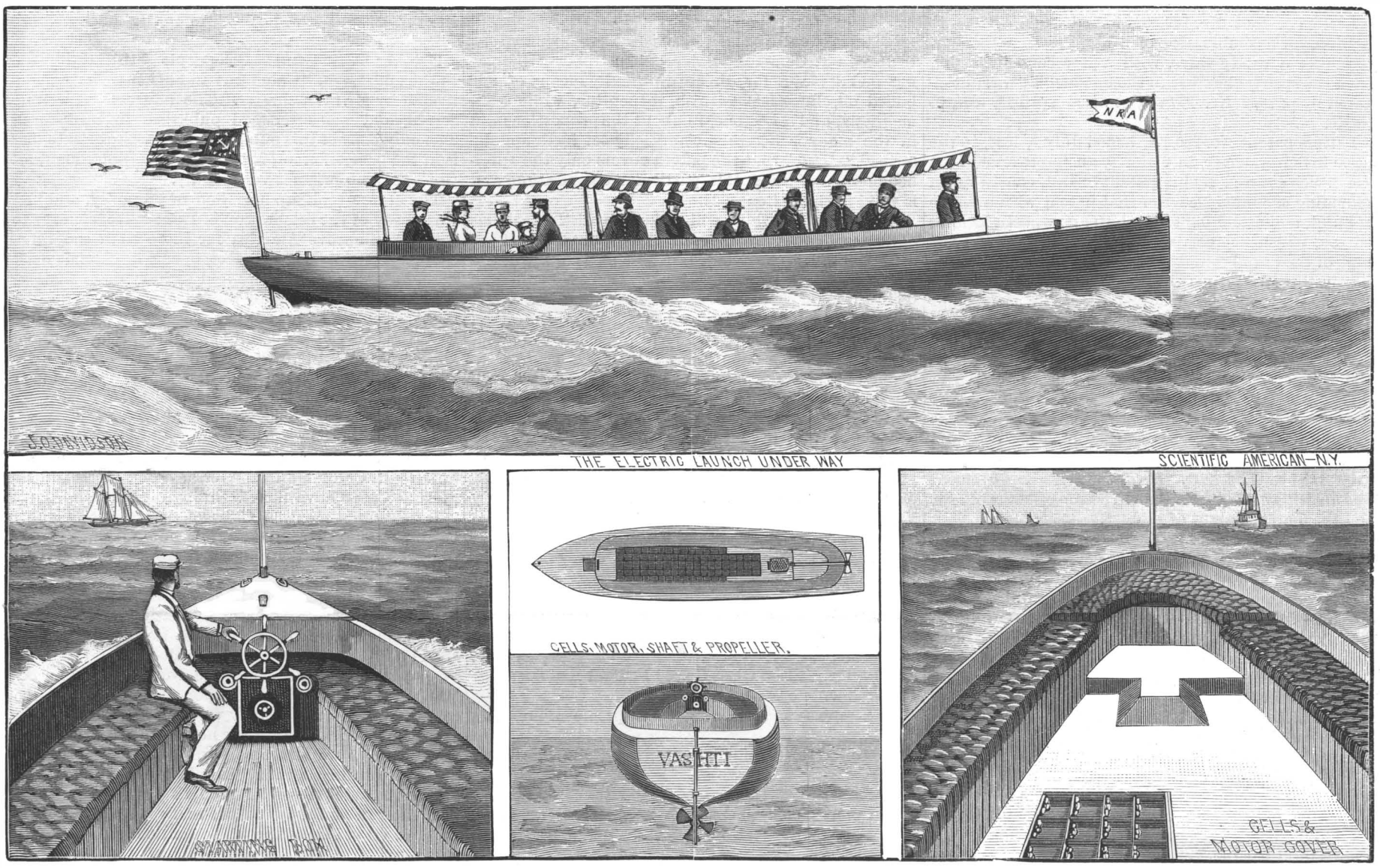
This starting wheel and the steering wheel are located together at the forward part of the cockpit and both can be operated by any one, though he be unfamiliar with boats and electricity.

The electrical energy is stored in 72 storage batteries which are underneath the floor and this gives the boat great seaworthy qualities, as they practically act as so much ballast next the keel. The motor also is under the floor and placed in the stern of the boat. It is of special design, invented by Professor William Main, and manufactured by the Union Electric Company, of New York. It is the slowest-running electric motor ever made, and is connected direct to the propeller shaft, thus eliminating all speed-reducing devices, which are noisy and wasteful of power.

The Vashti is 30 feet over all, 6 feet 6 inches beam, 2 feet draught, and hull is built of oak frames, white cedar planking, copper fastened; the cockpit is 23 feet long in the clear and has seating capacity for 25 to 30 people; interior woodwork is fine quartered oak. It was built by Charles L. Seabury & Co., Nyack-on-the-Hudson.

Every part of the length and width of the boat is available for use of passengers, as all machinery is below the floor and out of sight. It is impossible to imagine anything more attractive, no engine, no fire, no smoke, no smell, all the weight below the water line, and there probably never was a boat which combined more perfectly the desirable qualities of comfort, speed and stability. The batteries hold a charge for a 9 to a 10 hours' run and the speed developed is 8 to 10 miles per hour.

The only question of success heretofore with electric storage and storage batteries in street cars has been in the durability of the storage cells. These cells (as well as the motor and switching apparatus) are made by the Union Electric Company, of 45 Broadway, and it is stated that they cannot be buckled or sulphated, and, having no active material to fall out, cannot in any way be injured by high rates of charge and discharge, by short circuiting, jolting, or standing idle. A cell of such qualities, combined with the remarkably slow speed motor, in which there is no revolving wire, and consequently minimum wear and tear and liability to accident, ought to solve the problem of electric traction for both street cars and launches.



THE NEW ELECTRIC LAUNCH VASHTI.

Pastes for Cancer.

One hears so much of the knife and of drugs in cancer that it is something of a novelty to meet with an article from an eminent and scientific physician arguing in favor of caustic pastes. Dr. A. K. Robinson, in the *International Journal of Surgery*, maintains that in epitheliomatous tumors, during the earlier stages, and even when they are of considerable size, the use of caustic potash will give much better results as regards complete removal of the disease than can be obtained with the knife, provided the same area of tissue is destroyed or removed in both operations. He is furthermore satisfied that from the use of the caustic potash, and some of the other caustics, there is formed in the tissues cauterized a toxalbumin which is destructive to the cancer cells, or organisms, if such exist. Perhaps, he adds, it is the inflammatory process alone that gives such good results in the primary tumor, but when one sees enlarged lymph glands at a distance from the primary tumor diminish in size after the cauterization, it is difficult to avoid the view that such an agent must be acting.

Of chloride of zinc the writer says: This can be used either in stick form, or in solution, or in a paste. It does not destroy tissue so rapidly as caustic potash, and it causes much more pain, which also lasts for a much longer period. It destroys both normal and pathological tissue, although not with an equal degree of rapidity, and it is a most valuable agent in the treatment of epithelioma. In all the cases suitable for the use of the potash the zinc can also be employed, and, in the stick form, on account of its slower deliquescence, and the ability to use it as a pointed pencil or arrow, it is much to be preferred for some cases. A chloride of zinc paste is one of the best means we possess in the treatment of cutaneous epithelioma, and has also been strongly recommended for mammary cancer.

In the use of arsenious acid in the form of a paste (Marsden's paste), Dr. Robinson says we have an agent that in a certain class of cases has given the best results seen from any treatment. Marsden's paste consists of equal parts, by weight, of arsenious acid and powdered acacia, rubbed well together, and enough water is added to make a paste about the consistence of butter. The paste must be freshly made each time it is used. It is spread upon muslin or rubber plaster in a layer about a quarter of an inch thick, and firmly applied to the part. Marsden advises that it be not applied at one time to a larger area than one square inch; but the writer has applied it to very much larger surfaces and has never seen any injurious effects. It is not suitable for cancer of the lip, or of mucous membranes, on account of the danger of poisoning by absorption. A study of its action on a tumor of small size will give an idea of the result obtained when the treatment is properly conducted.

Comparing zinc and arsenic, Dr. Robinson says: The effect of the chloride of zinc paste in twenty-four hours is the same as that of the arsenious acid paste in sixteen to eighteen hours; but the injury to the normal tissue is greater with the former than with the latter; consequently the Marsden's paste has a tendency to destroy the pathological tissue in a special manner, in addition to the action of a non-elective injurious agent, which destroys pathological tissue sooner than normal, provided the action requires to be exerted for a period of time to produce destruction of tissue.

The "cancroin" treatment of Adamkiewicz, the aniline dye treatment of Mosetig-Moorhof, the thallin papain treatment of Granville, and the voltaic treatment of Parsons, all seem to have made little impression on cancer therapeutics, and we are brought by Dr. Robinson back to the treatment of our fathers; and, we may add, of many successful quacks.—*Medical Record.*

Naval Notes.

The new British war ship Iphigenia lately went on her forced draught trials, when she developed 9,302 indicated horse power, as a mean of four hours run, the contract power being 9,000. The mean air pressure in stokehold was 0·8 in. It is interesting to note as an indication of the power of this vessel to make spurts, that with a maximum air pressure of 1·2 in. she developed 10,016 indicated horse power, the speed on one run on the measured mile being 22 knots. The engines of the vessels are pronounced to be among the most perfect ever delivered at Portsmouth dock yard, which reflects great credit on Mr. Shepherd, the managing director of the company, as they are the first constructed by the company for the Admiralty. In the reversing, etc., trials, orders being given from the fore bridge, the time taken from the ringing of the gong to stop and full speed astern was just within the three seconds, from full speed astern to full speed ahead 2·5 seconds, from full speed ahead to stop, go ahead starboard engine, 2·7 seconds, and from stop her to full speed ahead starboard engine, full speed astern port engine, 2·3 seconds.

Recent Decisions Relating to Patents.

Letters patent No. 336,043, issued February 9, 1886, to Percival Everett, claims: "A weighing machine, having an aperture for receiving a coin, a weighted lever, a dial, and index hand, and intermediate mechanism connected with the same, and whereby the coin, when deposited in the receiver, shall operate the lever, and cause the hand to indicate the weight of the person or body being weighed." *Held*, that the patent possesses both invention and novelty, for, although a weighted lever, operated by a coin put through a slot, had been used for various other purposes, these elements had never been combined with mechanism to form a weighing machine. 1.

Letters patent No. 349,720, issued September 28, 1886, to Edward S. T. Kennedy for an improvement in boiler deflectors, consisting in the combination with a porcupine boiler and its jacket of horizontal flame deflectors of segmental form, placed within the combustion chamber in position for protecting the exposed ends of the tubes and deflecting the heated products of combustion toward the boiler cylinder, are void for want of patentable invention and novelty. 2.

Where two patents cover practically the same invention, the presumption is in favor of the senior patent, and it requires a clear preponderance of the evidence to show that the junior patentee was in fact the first inventor. 3.

Letters patent No. 299,503, issued June 3, 1884, to Ashton, for a combination of a muffling chamber surrounding a safety valve, with a pipe communicating from the spring chamber to the outside air, was anticipated by patent No. 297,066, granted April 15, 1884, to Coale. 4.

Letters patent No. 280,421, issued July 3, 1883, to the same inventor, cover, in claim 2, an improvement on the device covered by his patent of 1881, consisting in providing the inner sleeve of that patent with a flange annulus, and attaching to the hub and wheel a locking button, which engages with notches or teeth on the edge of the annulus and locks it to the hub, so that the sleeve will always turn with the axle or hub. The inner sleeve was also made adjustable as well as the outer one. *Held*, that these were mere mechanical adaptations of the device shown in the English patent of 1880 to Monks. 5.

In the patent of 1881, the bearing box, having a V-shaped groove, was attached directly to the frame of the machine, but claim 3 of the 1883 patent covered a combination wherein the bearing box was free, and was placed within and attached to a shell, which was itself fixed to the frame. *Held*, that this improvement was anticipated by the Salamon bearing patent of 1880, and the Jeffery patent of 1883. 6.

Letters patent No. 245,542, issued August 9, 1881, to Thomas W. Moran, for a rubber ball or cushion upon the extremities of velocipede handles, to counteract the jar on the hands in traveling and prevent injury to the machine in falling, are anticipated (if patentable at all) by the English patent of July, 1877, to Harrison. 7.

Letters patent No. 310,776, to William P. Benham, cover a method of fastening a handle bar consisting of a single piece to the steering head of the bicycle, so as to prevent any lateral or rotary motion, the claims being for the combination of an undivided bar and an open-slotted lug, and two sleeve nuts, or their equivalents, one on either side the lug, surrounding the bar, and adapted to lock it rigidly to the lug. *Held*, that, if there was any scope for invention in attaching a horizontal bar to a vertical one so as to be immovable, the patent was anticipated by the English patent to Illston, issued in 1879, which accomplishes the same result in substantially the same manner. 8.

Design patent No. 17,243, issued April 5, 1887, to Daniel C. Ripley, for footed bottles and jars, consisting of a spherical body, a figured ring-neck, covering a zone of the body, and having a raised pattern on its entire surface, was not anticipated by certain designs having a general resemblance thereto in shape, but lacking the raised ornamentation of the neck. 9.

Although the suit does not involve the method of producing the result, yet, in considering the question of anticipation, the court may properly take into consideration the fact that the patentee invented the method of making articles of glassware having a "blown" body and a "pressed" neck, thereby rendering possible the raised ornamentation of the neck in the patent. 10.

Letters patent No. 128,925, issued July 9, 1872, to Charles A. Taylor, covers, in claim 3, a fastening for trunk lids, which consists of a plate attached to the trunk body, and containing a socket, a hinged latch, and a double-acting spring to hold the catch either open or shut, and a tang fastened to the lid, which drops into the socket and is held by the catch. *Held*, that the claim covers a patentable invention, and was not anticipated by either the patent to Semple of 1866, to Cutter of 1868, to Locke of 1871, or by the Hillebrand or Ransom patents. 11.

Letters patent No. 108,085, issued October 11, 1870, to John B. Augur, for a new method of equalizing the pressure upon carriage springs, comprised a device consisting of a rod attached to the rear axle of a side spring vehicle, having two links rigidly attached, one to each of its ends, on which links the rear ends of the side springs are pivoted, so that when one spring is depressed the other is depressed also by the action of the rod connecting them, and the body of the vehicle is kept approximately level. A patent issued to Stringfellow and Surles in 1861 was for a method of giving the bodies of vehicles a backward and forward motion by means of side springs attached to four supports by shackle bars, these latter being united to the supports and the ends of the springs by tie bars with forked ends, whose object was to brace the supports, and prevent their being twisted by the lateral swaying of the body of the vehicle. *Held*, that, as it was not the object and effect of the tie bars of the earlier patent to equalize the pressure on the springs, that patent is not an anticipation of the later one. 12.

The Augur patent No. 108,085, for carriage springs, in which the connecting rod has vertical links for the ends of the springs, and is attached only to the rear axle, leaving the other ends of the springs rigidly attached to the forward bolster, is not an anticipation of patent No. 122,079, issued December 19, 1871, to Topliff and Ely, wherein the connecting rods are attached to both axles, so as to allow both ends of the springs to act, and have their connecting links horizontal or dependent. 13.

EXTENT OF CLAIM.

Letters patent No. 184,759, issued November 28, 1876, to Joseph T. Commoss, claim "the method of preparing metal plates for direct printing by means of pale boiled oil, Benguela varnish, turpentine, white lead, magnesia, and soapstone, in about the proportions and in the manner herein substantially set forth and described." *Held*, that the patent covers only the specified method of using this particular composition, and is valid to that extent. 14.

A construction which will make two distinct claims of a patent cover, not different things, but one and the same thing, is to be avoided, if possible; and, where a device performs two distinct operations, a claim may be based upon each without covering the other. 15.

The words "substantially as specified," in the claim of a patent, are to be given effect; and where the claim, read literally, would be inoperative, their effect is to include in the claim elements or devices contained in the specification that are wanting in the claim. 16.

1. Am. Automatic Weighing Mach. Co. *v.* Blauvelt, 50 Federal Reporter, 213.

2. Kennedy *v.* Chicago City Ry. Co., 50 Federal Reporter, 196.

3. Ashton Valve Co. *v.* Coale Muffler and Safety Valve Co., 50 Federal Reporter, 100.

4. Same.

5. Pope Mfg. Co. *v.* Gormully & Jeffery Mfg. Co., 12 Supreme Court Reporter, 643.

6. Same.

7. Pope Mfg. Co. *v.* Gormully & Jeffery Mfg. Co., 12 Supreme Court Reporter, 637.

8. Same.

9. Ripley *v.* Elson Glass Co., 49 Federal Reporter, 927.

10. Same.

11. Sessions *v.* Romadka, 12 Supreme Court Reporter, 799.

12. Topliff *v.* Topliff, 12 Supreme Court Reporter, 825.

13. Same.

14. Commoss *v.* Somers, 49 Federal Reporter, 920.

15. Page Woven Wire Fence Co. *v.* Laud, 49 Federal Reporter, 936.

16. Lee *v.* Pillsbury, 49 Federal Reporter, 747.

Apples as Medicine.

Chemically, the apple is composed of vegetable fiber, albumen, sugar, gum, chlorophyl, malic acid, gallic acid, lime, and much water. Furthermore, the German analysts say that the apple contains a larger percentage of phosphorus than any other fruit or vegetable. The phosphorus is admirably adapted for renewing the essential nervous matter, lecithin, of the brain and spinal cord. It is, perhaps, for the same reason, rudely understood that old Scandinavian traditions represent the apple the food of the gods, who, when they felt themselves to be growing feeble and infirm, resorted to this fruit for renewing their powers of mind and body. Also, the acids of the apple are of signal use for men of sedentary habits, whose livers are sluggish in action, those acids serving to eliminate from the body noxious matters, which, if retained, would make the brain heavy and dull, or bring about jaundice or skin eruptions and other allied troubles.

Some such an experience must have led to our custom of taking apple sauce with roast pork, rich goose, and like dishes. The malic acid of ripe apples, either raw or cooked, will neutralize any excess of chalky matter engendered by eating too much meat. It is also the fact that such fresh fruits as the apple, the pear, and the plum, when taken ripe and without sugar, diminish acidity in the stomach, rather than provoke it. Their vegetable sauces and juices are converted into alkaline carbonates, which tend to counteract acidity.—*Southern Clinic.*

How the Columbian Anniversary was Celebrated One Hundred Years Ago.

While the world is doing honor to the memory of the great Columbus, it will be interesting to review that page of history covering the celebrations of 100 years ago.

It is probable that 1592 and 1692 passed without special thought being given to the discoverer of America. October of 1792, however, was not allowed to pass unheeded. Oddly enough the great celebration at that time was held in England, where the resentments caused by the American revolution were still rife. But the promoter of the affair was a native of the States, and had the good of his country thoroughly at heart. His name was Elhanan Winchester. And though he did not succeed in securing for himself an everlasting fame, he was during his life a noted character.

In 1788 Mr. Winchester conceived the idea of organizing a ter-centennial celebration. He had already acquired something of a reputation in America and England as a sensational preacher, and so he had little trouble in interesting the public in his scheme.

He made no attempt to gather the fruits of the world to be displayed to the curious. It never occurred to him that great temples should be reared for the purpose of demonstrating the progress of civilization. There was little pomp or ceremony about his "exposition." But all that he did attempt he made successful.

October 12, 1792, full 20,000 people gathered to listen to the address on "Columbus and his Discoveries," delivered by Mr. Winchester. The address was well received, and was afterward published in book form. The only copy of this publication known to exist to-day is in the possession of Mr. James T. Onderdonk, of Chicago, who prizes it very highly.

The orator took up the line of prophecy, and had this to say of the celebration of 1892: "The century to come will improve America far more than the three centuries past. The prospect opens, it extends itself upon us. 'The wilderness and solitary place shall rejoice, and the desert shall rejoice and blossom as the rose.' I look forward to that glorious day when that vast continent shall be fully populated with civilized and religious people, when heavenly wisdom and virtue and all that can civilize and bless the children of men shall cover that part of the globe as the waters cover the seas."

As the orator warmed up to his subject, glowing with the beatific prospect of America celebrating the four hundredth Columbian anniversary, dim visions of the actual seem to have flitted through his brain. It is true he did not mention Chicago, or the World's Fair or the Sunday closing question, but he came much nearer the mark than many more celebrated prophets.

"Transported at the thought," he continued, "I am borne forward to days of distant renown! In my expanded view, the United States rise in all their ripened glory before me. I look through and beyond every yet peopled region of the New World, and behold period still brightening upon period. Where one contiguous depth of gloomy wilderness now shuts out even the beams of day, I see now States and empires, new seats of wisdom and knowledge, new religious domes spreading around. In places now untrod by any but savage beasts, or men as savage as they, I hear the voice of happy labor, and see beautiful cities rising to view, behold the whole continent highly cultivated and fertilized, full of cities, towns and villages, beautiful and lovely beyond expression. I hear the praises of my great Creator sung upon the banks of those rivers now unknown to song. Behold the delightful prospect! See the silver and gold of America employed in the service of the Lord of the whole earth! See slavery, with all its train of attendant evils, forever abolished! See a communication opened through the whole continent, from north to south and from east to west, through a most fruitful country. Behold the glory of God extending and the Gospel spreading through the whole land!"

The orator did not confine his information to the body of his speech, but appended to the published copy a description of a new city to be called Washington, situated at "the junction of the rivers Pawtomack and the Eastern branch." There is also added a schedule from the first census, then just completed, certified to by T. Jefferson, Secretary of State. The total population of the United States foots up no less than 3,925,253. Virginia leads with 747,000, Pennsylvania follows with 434,000; New York State with its 340,000 stands fifth; the Northwest Territory boasts of 5,000. In point of size the towns ranked Philadelphia, New York, Boston, Baltimore, and Charleston. In point of trade, New York. Philadelphia, Boston, Charleston, and Baltimore. The future World's Fair city was not a rival.

For two years after the delivery of this oration Mr. Winchester continued to stir up his British auditors with his pleas for universal liberty as well as universal salvation. Returning to this country in 1794, he died at Hartford in 1797.—*Inter-Ocean.*

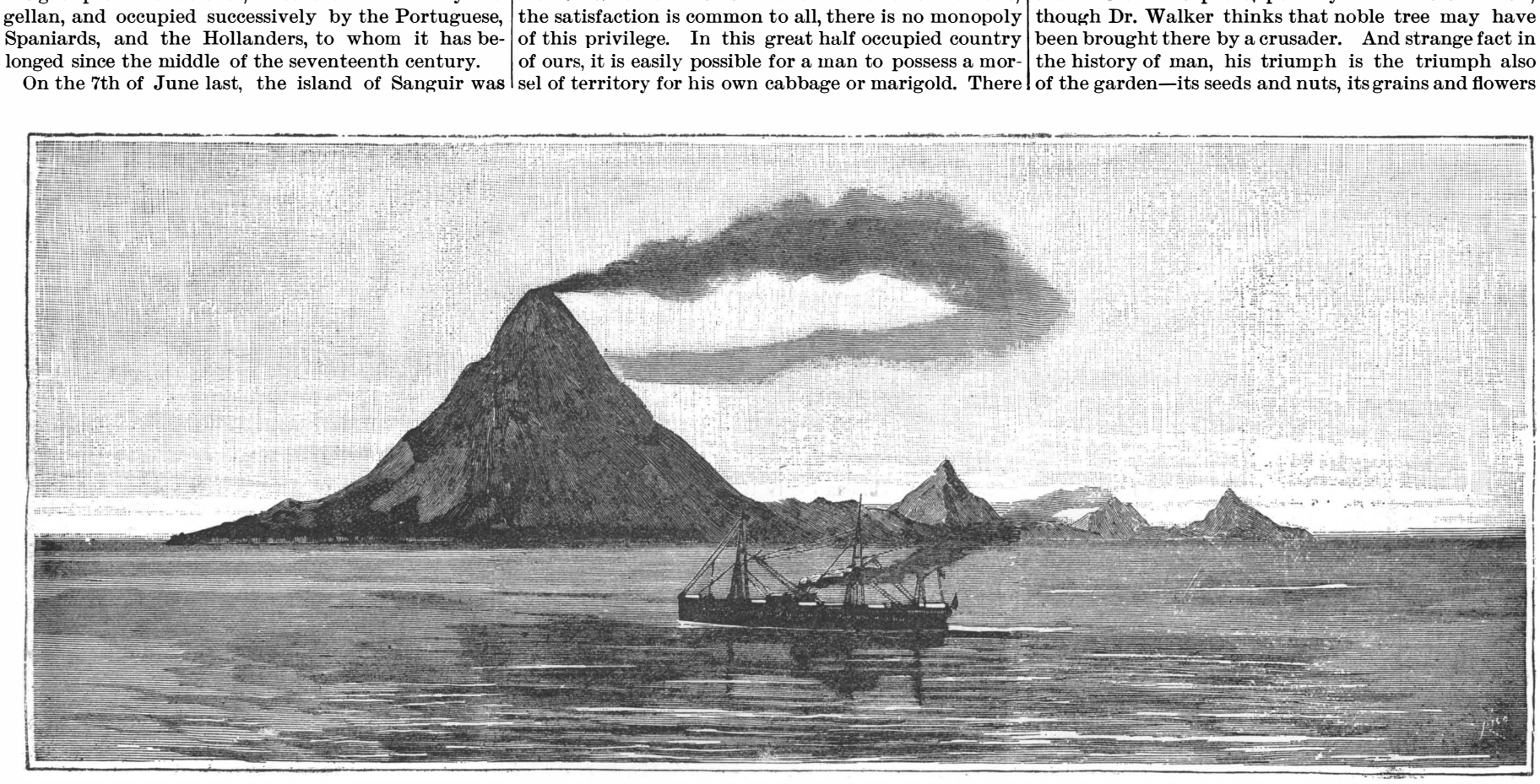
Vegetable Digestive Ferment.

MM. Daccomo and Tommasi have studied the action of *Anagallis arvensis*, which they find possesses the property of destroying rapidly and without pain fleshy growths and even horny warts. They assumed that the plant contained a ferment, analogous in its action to pepsin and pancreatin, and instituted some experiments to decide the point. Some fresh meat and fibrin were placed in contact with a small quantity of the fresh plant reduced to powder, and, after being maintained at a temperature of 40° C. for four to five hours, they were found to be considerably softened, being dissociated almost completely in about thirty-six hours, during which the temperature did not exceed 45°. The presence of a ferment was thus regarded as established, and the authors are stated to have succeeded in isolating it under the form of a white amorphous substance, easily soluble in water. It is said to have no action upon starch, and further details as to possible practical applications of the ferment are promised upon the completion of continued researches. —*Rev. de Therap.*

THE DESTRUCTION OF SANGUIR.

The island of Sanguir is 25 miles long and 15 broad, situated in the great Malay Archipelago, which extends between the Indian and Pacific Oceans, or between China and Australia, corresponding geographically to the group of the Celebes, discovered in 1521 by Magellan, and occupied successively by the Portuguese, Spaniards, and the Hollanders, to whom it has belonged since the middle of the seventeenth century.

On the 7th of June last, the island of Sanguir was suddenly and violently shaken by the eruption of its only volcano, that of Gunona-Avu, by which the island was almost entirely destroyed, and 12,000 inhabitants met with death. The particulars were brought to the government of Holland by the captains of the merchant steamers Harlem and Cattertum. The volcano after its frightful eruption, which devastated the entire vicinity, sank down into the sea, together with all the northeast portion of the island. The opposite part, where the principal European ships were anchored, was saved.



THE VOLCANO AND ISLAND OF SANGUIR, PRIOR TO ITS DESTRUCTION.

Gardening a Human Bond.

If there is one pursuit that forms a link between human beings of different stations and habits, gardening is certainly that occupation, for whether it be the vocation or the avocation of man or woman, it appeals to so fundamental a taste that it makes a common ground upon which all can meet with interest and sympathy. It is the primal occupation of man, the final result and joy of his highest civilization. From the clod we come, to the clod we return, actually and figuratively, our fashioning from the dust of the earth pointing plainly to the fact that man was a graminivorous creation, deriving his sustenance from the grains he rescued from the tropic sands where he originated. It is a theory of the historical philosophers that man first developed into civilization in some rainless and unchanging region like Egypt, or the western slope of the Andes, and that there, under unvarying conditions of climate, he first established communities, and tilled the soil—hence, possibly, this old idea of his evolution from the dust of the earth.

As the animal with forethought to plant and dig was an advance upon his predecessors, so the agriculturist is a higher development than the nomad who goes in pursuit of his crops instead of waiting for them to come to him; and it is a curious fact that after man has circled the globe in pursuit of wealth or amusement, he comes back to the culture of his own acres as the most dignified and satisfactory ending of his career, the only one which is not an anti-climax. Contented and not inglorious, Cincinnatus returns to his plow, Washington to Mount Vernon, Jefferson to Monticello, and Mr. Gladstone to Hawarden. The spectacle of Mr. Pitt, happy in a three years' release from political life, and enthusiastic in the culture of his garden, is one unfamiliar to the world, which scarcely disconnects him from the great arena in which he was the central figure, but is gratifying as an evidence of the humanness of that great statesman, and of that solid wisdom of which he gave perpetual proof in his public career.

Poets and philosophers alike have rejoiced in rural shades, in the charm of pleasant labor among their flowers and trees. Gardening is the delight of royalty and the comfort of the cottager. The greatest ladies in England have taken pride in designing their own parterres, while the gamekeeper's daughter rejoices in her little square of flowers. It is an occupation for the very rich, a solace for the very poor. It can occupy acres of territory, it can be carried on within the limits of a grocery box. It is the priceless heritage of man, this right to till the soil, this joy in its accomplishment. Whether the results be utilitarian or æsthetic, the satisfaction is common to all, there is no monopoly of this privilege. In this great half occupied country of ours, it is easily possible for a man to possess a morsel of territory for his own cabbage or marigold. There comes a period in the lives of most when this primal desire demands accomplishment. Then upon his fragment of the earth's surface a man sits down, and content begins. Not idle content, certainly, since only by the sweat of his brow can man overcome nature, but that discounted content which is the human substitute for happiness.

Results may disappoint in detail, but the aggregate produces a certain mental well-being which peer and peasant alike share. The triumph of the harvest is for all, and though there may be years when harvests fail, they are the exception. There may be a harvest of the spirit, even if the crops fall short, a gain in health and knowledge from the hours of labor that are a balancing gain for disappointment. It is not only material results we gather in, but the harvest of experience, the gain of wisdom, the science for the coming years, and in these human benefits there are no hampering trusts. The planter may sell his crops a year or two ahead, and find himself short of the market, but there is no corner in experience which confines it to a chosen few, and of this gain the gardener, be he high or low, may be sure, so that his labor can never be a dead loss.

Moreover, he who loves his garden is in touch with his kind whether he find himself in Columbia or Cathay, for on this topic all may meet, the Russian mujik and the Czar, the Egyptian fellah and the Bey, the American traveler and the Daimio of Japan. There are gardens from Babylon to the Golden Gate which have delighted the heart of man from Eden until this day. To be cast out from a garden was the curse of Adam, and the struggle of fallen man ever since has been to repair that primal disaster. A hankering for an Eden is at the bottom of our wandering souls, and we are ever striving to fashion it to our conception of the lost Paradise. The idea is common to all—the expression varies in each individual. If originality inspires the owner, the garden will be original; if the conventionalities be dear to him, you will find formality in the arrangement of his flower beds; the artist will interweave it with his taste and fancy, the poet will seek in it to embody his dream, the practical man will turn it into a potato field, the speculator will plant it with wheat, a sentimentalist will fill it with roses and lilies, an æsthetic with sunflowers. And from whatever clime you come you will read the man in his garden, nor need an interpreter to explain him to you.

There is no region where man's effort to reclaim the soil does not possess an interest for all other men. No tale of the march of conquering hordes captivates like the story of the founding of a state, and the state's foundations are laid by its plowshares. In Egypt the great river has been harnessed for the service of man, in Holland he has fought the sea to win a foothold for his sturdy independence, a garden for his bulbs. With the Romans marched the culture of Europe, in the wake of their great armies sprang up the cereals and the trees of the forest. Cæsar was no less a conqueror of the soil than of opposing armies. He carried in one hand the sword, in the other the life-giving grain. To him, first of all, Britain owes the planting of her barren acres with fruit trees, with the lime, the chestnut and the plane, possibly with the elm itself, though Dr. Walker thinks that noble tree may have been brought there by a crusader. And strange fact in the history of man, his triumph is the triumph also of the garden—its seeds and nuts, its grains and flowers springing up in the footsteps of Alexander and Xerxes, of crusader and Spanish don, to flourish and comfort long after the mailed hand that brought them was dust.

Thus in the path of the oppressor came a blessing, "out of the strong came forth sweetness." Here again that human touch links us with the old warrior of the past, bringing home from Damascus a rose slip to gladden the garden of his sweetheart, a sprig of vine to commemorate the hills of Palestine on the borders of some English lake. It is pleasant to think how the memory of his own garden made the Macedonian bring home to Greece the flowers that his master wrested from Darius. The rose from Persia, the lily of the farther East, are a bond of common interest between the old and the new; between the mailed past and prosperous present. The lotus of the Pharaohs is the glory of a Jersey mill pond, the peony of the Hoang-Ho is the ornament of a dooryard by the Charles, our very weeds bind us together to fight a common enemy, and thus the love and care of a garden brings man into fellowship with all the sons of Adam.—*Garden and Forest.*

Artificial Gum Arabic.

For the preparation of a so-called artificial gum arabic the *Rev. de chim. indust.* (through *Nouv. Remèdes*, 1892, No. 13 supplem.) gives the following process: 10 kilogrammes linseed are boiled with 80 kilogrammes sulphuric acid and 100 liters of water for three or four hours. The liquid is then filtered and four times its volume of alcohol is added. The precipitate is collected, washed and dried. The product is amorphous, colorless, insipid, and gives with water a thick mucilage.

Electrical Gleanings.*

BY PROF. W. W. JACQUES.

Electricity as a science dates back for centuries. Electricity as an art has been developed within the memory of men still living. The study of electricity as a science, that is, the study of electric phenomena and laws for their own sake, independent of the uses to which they may be put, began when Stephen Gray, nearly 200 years ago, divided bodies into conductors and non-conductors, and thus made the conception of an electric current possible.

For 150 years after that investigators in the field of electrical science, working largely in the laboratories of the grand old German universities, were busy finding out how electricity might be produced, what were its laws of action, how it could be measured and what it was capable of doing. Thus was the *science* of electricity built up.

One evening, not many weeks ago, I was invited to witness some experiments in sending photographs over a wire by means of electricity. You may imagine that I went with a good deal of interest to the laboratory of my friend. The laboratory consisted of two rooms. In one was an ordinary photographic camera, a small developing closet, and on a table in the middle of the room a cubical box, in one side of which was a slit of sufficient size to receive a postal card.

From this box two wires stretched across the room to the partition wall, and, passing through this, extended to a similar cubical box standing on a table in the middle of the adjoining room.

I was given an ordinary postal card and asked to write a short note upon it, and wrote "Good morning! How do you do?" My friend then took the card and placed it about six inches in front of the camera, where it was well illuminated by an electric lamp. Then he pressed the button of the camera, then took the plate holder to the developing closet, and presently reappeared with a hastily made negative, which he dropped into the slit in the cubical box on the table in the middle of the room. I then went into the adjoining room, and there, issuing from the corresponding box on the table in the middle of the room, was a piece of thin paper the size of a postal card, on which appeared in *facsimile* the words I had written, "Good morning! How do you do?" There would seem to be no reason why the sending and receiving boxes, instead of being in adjoining rooms, should not be placed one at one end of the wires in Boston and the other at the other end in New York; and thus letters written in one city could be instantaneously photographed to the other, and beat the United States mail by six or seven hours.

Another experiment, in which I have taken part only this last week, was to sit in my Boston office and talk by long distance telephone with friends in Chicago, more than a thousand miles away. And this, too, as easily as if my friends had been sitting with me in the same room.

During the Centennial Exhibition in Philadelphia, Professor Bell exhibited his then undeveloped telephone, which, though it only whispered feebly and imperfectly, was declared by Sir Wm. Thomson to be "the greatest marvel hitherto achieved by the electric telegraph."

At the Columbian Exhibition, soon to be held in Chicago, we shall see that invention grown so big that it will talk loudly and clearly between that city and New York.

Another invention that must soon come—an invention whose underlying principles have been already worked out—an invention that is only waiting for some ingenious inventor to make, is a good method of electrical signaling between two vessels approaching each other in the midst of a thick fog at sea.

Let us imagine such a device applied to two ocean greyhounds approaching each other with a combined velocity of 40 miles an hour through a heavy fog in a dark night. The lights are useless, for even an electric search light will not be visible a mile away. The steamer's whistle is useless, for the fog soon absorbs the sound; and yet these two vessels may be rushing immediately toward each other with a force and velocity that, in case they meet, shall mean total annihilation.

And yet there is no need of such danger. Means of producing electrical signals on the one vessel already exist. The ocean is an excellent medium for conducting these signals to another vessel many miles away, and means, on the second vessel, for detecting and recognizing such signals may easily be contrived.

Let us see how electricity steps in and points out a simple way by which such collisions may be avoided.

Suppose each vessel to be equipped with an insulated wire running from bow to stern, but dipping into the ocean at each end. Suppose one vessel to have included in this wire means for producing strong and rapidly alternating currents of electricity. Suppose the second vessel to have connected to its wire an ordinary listening telephone.

Electrical undulations will be radiated from the first vessel through the water in all directions until, reaching the second vessel many miles away, they will be heard in the listening telephone.

By equipping each vessel both with means for sending out electrical undulations and for listening for any that might be received, each vessel would be made aware of the approach of the other and the danger of collision avoided.

But the greatest electrical harvest to be gleaned in the near future will come when some inventor or engineer devises a method of converting the energy stored up in coal directly into electrical energy.

* Abstract of a lecture delivered before the German Technical Society of Boston, October 6, 1892.

Potsdam Sandstone.

We are indebted to the Potsdam (N. Y.) Red Sandstone Company for specimens from their quarry. This remarkable stone has shown a resistance of more than 42.804 pounds crushing weight, while the strongest granites will stand only 19.750 pounds, and other stones still less. The color of the Potsdam product is soft light reddish. For building purposes it has no equal.

RECENTLY PATENTED INVENTIONS.

Engineering.

STEAM BOILER FURNACE.—Micheal E. Herbert, St. Joseph, Mo. This is an improvement on formerly patented inventions of the same inventor, providing a fire box which can be arranged in connection with an ordinary horizontal boiler without alterations to either the fire box or boiler, and dispensing entirely with fire brick, the smoke nuisance being also abated without the use of complicated devices, and the steaming capacity of the ordinary boiler being increased. The fire box is composed of four water legs, essentially independent of the boiler, the end legs being concaved at their upper sides, adapted to receive and support the boiler, while tubular grate bars connect the end legs.

Railway Appliances.

CAR SEAT.—Conrad H. Matthiessen, Odell, Ill. This is a simple and inexpensive seat in the form of a readily reversible chair, which may be easily adjusted to rest at any desired inclination, has a convenient foot rest, and the seat is not likely to get out of repair. The chair is designed to be very convenient for both day and night use, being well adapted for a sleeping chair, and it has the advantage of having the arm rests stationary and the seat movable, as desired, the arms being straightened out when a person has tipped back in position for comfortable sleep.

RAILROAD SIGNAL.—Eugene Urbain, Brooklyn, N. Y. This is a signal to be automatically operated by a passing train, indicating when a train is approaching, front or rear, or has passed a given point. It is an electric signal comprising a series of lights and bells arranged alongside the track, circuit-closing contacts connected therewith being placed adjacent to the track rail, while vertically and longitudinally movable levers arranged in pairs are placed near the track in the path of the car wheels, the levers having oppositely extending inclined upper faces, with means for operating the circuit-closing contacts by the movement of the levers. The lights are intended to operate at night and the bells in the daytime, and the signal is operated during the time taken by the train in passing the levers.

Mechanical Appliances.

RATCHET DRILL BRACE.—William P. Nolan, San Francisco, Cal. This is a simple and durable implement, arranged to revolve the drilling tool at a high rate of speed in either direction. Its construction is simple, and it can be readily taken apart to be examined. The crank arm has spring-pressed pawls alternately engaging a ratchet wheel carried by a disk turning in a casing, a series of gear wheels journaled in the disk being in mesh with an internal gear wheel, while a shaft journaled in the disk carries a gear wheel in mesh with the series of gear wheels. The speed to be attained may be increased or diminished by changing the relative proportions of the gear wheels.

AUTOMATIC SPRINKLER.—John Kane, Philadelphia, Pa. This is an improvement in devices used in factories, machine shops, etc., where the sprinkler is caused to operate when a certain degree of heat is reached, as by the starting of a fire, a fusible connection then being melted. The prime feature of the invention consists in the location and construction of the "distributer," or that portion of the device whereby the stream of water is deflected and made to pass downward or upward from the deflector and out from its sides.

FLOUR MILL FEED REGULATOR.—Marcus A. Swing, Washington, Ind. This is an improvement on a former patented invention of the same inventor, to simplify the feeder, and more entirely prevent any clogging or sticking of the grain, all the parts of the device being easily removable and adjustable. In combination with the hopper is a feed board reciprocated by spring wire rocking arms, the arms being operated by a vertically adjustable revoluble shaft, upon which is a friction roller contacting with a grinding roll, the invention also embodying other novel features.

Miscellaneous.

TELESCOPE SIGHT FOR CANNON.—Valentine Berberich, Frankfort, Ky. This is a sight instrument supported alongside the gun and conveniently detachable from it, so it can be taken off after sighting to prevent injury to the instrument by vibrations. It consists of a telescope adjustably supported upon a frame, which also supports a sight in the range of the telescope, and adjustable independently of the telescope, the frame also having a number of lateral openings receiving rods projected from the side of the gun, and so arranged that the instrument will be parallel with the bore of the gun.

DENTAL INSTRUMENT.—John C. Blair, Louisville, Ky. This is an instrument for treating dead teeth preparatory to filling, by injecting a vapor or gas into the pulp cavity and root canals, to disinfect them and destroy poisonous matter. The instrument consists of a small tube on which is a wooden casing forming a handle, and a short cylindrical receiver or gas generator, to hold medicinal substance while being vaporized. A hollow needle is screwed on one end of the tube, and a rubber tube is connected with a compressible bulb attached to its other end.

WHEEL GUARD.—Patrick J. Connell, College Point, N. Y. This is a device to be placed temporarily upon a portion of a carriage wheel to prevent one from soiling the clothes in getting into or out of a carriage. It consists of two hinged sections having depending sides and adapted to lie one within the other, a spring normally holding the sections extended, and a spring clasp embracing the top and sides of one of the sections. This guard may be conveniently carried beneath the seat, and may be put on or removed from the wheel without soiling the hands.

FOLDING CHAIR.—Herman A. J. Rieckert, New York City. This chair has two sides, each formed of two legs connected by bars, the rear legs being semicircular and hinged together, and one of the legs being extended to form a back, while a seat hinged to the top bar of one side rests, when open, on the top bar of the other side, the seat folding down on the outside of one side when the chair is folded.

LAMP EXTINGUISHER.—Max Goetze, Sturgis, South Dakota. A safety device for hand and stand lamps is provided by this invention, one which will automatically cover the top of a flat wick tube and extinguish the lighted wick if the lamp is overturned or dropped and its chimney displaced or broken. Two pivotally supported and weighted gates inclose the upper end of the wick tube, a bowed arm being adapted to lift the gates and close them, while a lever normally holds the arm away from the gates.

BUCKSAW.—Peter Woodring, Oelwein, Iowa. This invention relates especially to the frames of bucksaws in which braces cross each other diagonally between the handle and forward end, and, in connection with the adjustable stretcher, stiffen and support the frame. This improvement, while providing every facility for adjustment, affords a more rigid support to the frame, prevents it from getting out of shape or becoming racked, removes the strain largely from the stretcher while the saw is being used, and holds the saw effectually at its strain or stretch.

STOVE.—Olof Nilson, Salt Lake City, Utah Ter. The prime object of this invention is to so construct the stove that every portion of it likely to receive dust or soot may be cleaned without soiling the hands, carpet, or floor, all of the dust or soot loosened being carried to one receptacle in the stove and readily removable therefrom. The oven is also so located that the heat and products of combustion circulate entirely around it, insuring uniform baking in all parts.

SHOE FASTENER.—Joseph H. Hamill and Paul J. Johnson, Globe, Arizona Ter. Attached to the outer flap is a receiving section, comprising a cylindrical cap above a round hollow base having attached locking flanges, while attached to the under flap is a locking section comprising a stud with a head extended at an angle beyond one of its sides, the head entering and passing through the hollow base of the receiving section. The device is intended as a substitute for ordinary buttons and laces, being much more conveniently manipulated, and affording an absolutely secure fastening.

CUFF HOLDER.—Lewis S. Sampson, New York City. This device comprises a bar to be attached at one end to the sleeve, and having at its other end a swinging member, at the opposite ends of which are fastenings, so that the bar may be made to engage one or two button holes of a cuff. The device is designed to facilitate the use of the ordinary reversible cuff as a link cuff, the holder being applicable in both ways.

ADVERTISING DEVICE.—Paul Herrmann, New York City. This is a novelty to be used upon a desk, table, etc., as a call bell, a different advertisement appearing at openings in the casing of the device each time the bell is rung. A revolving cylinder in the casing carries the advertisements to be displayed, and the casing may be fitted up to contain a cigar cutter, to receive salt cellars, or for various other uses.

ANIMAL TETHER.—Ralph E. Robison, Atoka, Tenn. This is a simple device which any one can readily carry into the field and fix in position to attach thereto one end of a cord or rope, so that an animal attached to the other end of the rope cannot pass beyond a prescribed limit. A post, tapered at one end to be conveniently forced into the ground, has at its upper end a bore forming a socket, in which is inserted a standard having a jointed upper extension, to an outer bent end of which the rope is attached. Near the joint is a spring, held in a novel manner to allow flexure of the joint, permitting the standard under strain to incline nearer the ground.

SMOKING TOY.—Joseph T. Craw, Jersey City, N. J. This is a novel suction device for smoking a cigarette, including a head with eyes arranged to be rocked and turned by the vibrations occurring as a flexible box-like structure at the rear is compressed and released from pressure, the cigarette held in position between the simulated teeth being simultaneously consumed, by the aid of the suction thus produced.

BADGE DESIGN.—William Connolly and Alvin A. Sealy, Brooklyn, N. Y. This is a political campaign badge, the leading feature of which is a representation of the White House, for which figures simulating horses with jockeys on their backs are heading.

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Notes & Queries

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Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

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Minerals sent for examination should be distinctly marked or labeled.

(4578) R. B. C. says: What can I use to the best advantage in a tank in which gold workers wash their hands, to catch the gold? A. Cover the bottom of your tank with mercury and allow the overflow water to pass over into a shallow tray filled with mercury. Or use a plate of amalgamated copper from which the amalgam may be removed from time to time and replaced by fresh mercury. The gold is extracted from the mercury by filtration and retorting.

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NEW BOOKS AND PUBLICATIONS.

DESCRIPTION OF THE STAR CAMERA AT THE SYDNEY OBSERVATORY. Sydney: Published by authority of the Honorable the Minister for Public Instruction. 1892. Pp. 15.

A detailed series of plates with description of the photographic telescope at the Sydney, New South Wales, Observatory is the matter of the present book. A very handsome photogravure of the instrument as mounted serves as frontispiece. It is noted in the introduction that the mounting was made in the colony, and it seems to be an excellent tribute to the mechanical abilities of the New South Wales engineers.

A TREATISE ON HYGIENE AND PUBLIC HEALTH. Edited by Thomas Stevenson, M.D., F.R.C.P. Lond., and Shirley F. Murphy. Vol. I. Philadelphia: P. Blakiston, Son & Co. 1892. Pp. xii, 1013. Price $7.50.

The scope of this most exhaustive work, of which in this large volume but one half is presented us, covers an immense ground. It is quite impossible to review it adequately. Among the subjects treated are air, meteorology, water, food, clothing, the dwelling, the disposal of refuse, and other allied topics. Each one is given in a monograph, and to each monograph, in the contents, and in the text of the work itself, the author's name is given. A double-column index of 21 pages gives an example for authors and publishers of scientific books to follow.

ALASKANA; OR, ALASKA IN DESCRIPTIVE AND LEGENDARY POEMS. By Professor Bushrod W. James, A.M., M.D. Philadelphia: Porter & Coates. 1892. Pp. 368.

Professor James, in this work, has, to a certain extent, abandoned science for poetry, and gives us a number of the legends of Alaska in the phrase of Hiawatha. It is stated that the author has taken the liberty of avoiding the tautology for which Hiawatha is remarkable. This statement is followed by the remark that "whether this slight innovation will be acceptable as an improvement or not, remains with its readers to decide." The work, we believe, is good enough to prove of wide interest, as it is elegantly printed and illustrated, though whether, even by avoiding tautology, it will be accepted as an improvement on Longfellow is doubtful.

INDUCTION COILS. A practical manual for amateur coil makers. By G. E. Bonney. With more than 100 illustrations. New York: Macmillan & Co. London: Whittaker & Co. 1892. Pp. 231. Price $1.

This excellent work, in adequately treating this subject, in describing batteries of the type adapted for induction coils, in its physical notes and by its hints on repairs in general mainipulation, will be welcomed by many amateurs and even professionals. One chapter is devoted to some famous coils, among others the great Spottiswood, which, with reasonably small battery, gave a 42 inch spark without difficulty.

A TEXT BOOK OF EXPERIMENTAL ENGINEERING. By Rolla C. Carpenter, M.S., C.E., M.M.E. New York: John Wiley & Sons. 1892. Pp. xx, 709. Price $6.

This work is so thorough, carried out in such detail, and so thoroughly illustrated that any review of it which will give an idea of its scope and merits is out of the question here. Cornell University is one of the great American centers of mechanical engineering, and Professor Carpenter, the associate professor there of experimental engineering, has produced a book which seems to be an exponent of the work of the great American university. Numerous illustrations, many carried to a great detail, are introduced, illustrating the testing machines and other apparatus employed for carrying out the work described in the volume.

DESIGN AND PROSPECTUS FOR THE NATIONAL GALLERY OF HISTORY AND ART. By Franklin W. Smith. Offices of the Propaganda for the National Gallery, 1419 F Street, Washington, D. C. 4to. Pp. 112; 144 Il. Paper. 50 cents.

The general scope of this new movement has been indicated on page 228 of the issue of the SCIENTIFIC AMERICAN for October 8. Though this work bears the modest title of prospectus and is published at a merely nominal figure, still it is really a work of art. This book gives illustrations of the new design, views from the Pompeian house and from all the chief galleries and museums of Europe. The views of the hotel Casa Monica and the Villa Zorayda in St. Augustine are very interesting, showing how concrete may be used for building purposes. This is of special interest, as the great design calls for concrete construction. Many illustrations are given of the proposed constructions for the courts of the great edifice. The book cannot fail to be of interest to all lovers of art and architecture, as well to friends of the new plan.

POOR'S DIRECTORY OF RAILWAY OFFICIALS AND MANUAL OF AMERICAN STREET RAILWAYS. New York: H. V. & H. W. Poor.

The latest edition of this most valuable reference book is just out, and comprises over 600 closely packed pages, the constant additions being made to the work rendering each successive issue more comprehensive than its predecessor. An entirely new feature of this edition is a "directory of directors," which fills a hundred pages, the directors thus catalogued including those managing banks, insurance companies, and general manufacturing and industrial enterprises, as well as railways. The statements of street railroads in the United States and Canada are now made very full, and a complete list is given of all railroads projected or now under construction in the country. The information thus afforded is of importance to inventors as well as to all manufacturers or dealers in railway materials. A list is also given of railways and tramways of Mexico, Central and South America, with their officers, mileage, etc., while the enumeration of "private" railroads makes quite a list, including lumber, logging, mining roads, etc.

DAIRYING FOR PROFIT; OR, THE POOR MAN'S COW. By Mrs. E. M. Jones. New York: Orange Judd Co. Pp. 66. 30 cents.

Mrs. Jones proves her right to speak with authority on the subject discussed in this little book by the fact that she began, eighteen years ago, with two cows and a small village field, selling a few pounds of butter, of such excellence that she now has a market for and produces annually seven thousand pounds. All the details of professional dairy work are described, the difficulties likely to meet the beginner are explained, and one is also told how to choose a good cow and keep and feed her to the best advantage.

☞ Any of the above books may be purchased through this office. Send for new book catalogue just published. MUNN & Co., 361 Broadway, New York.

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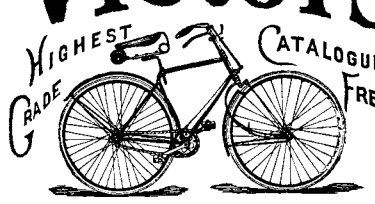

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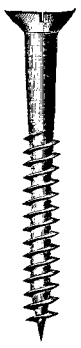

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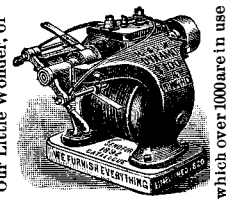

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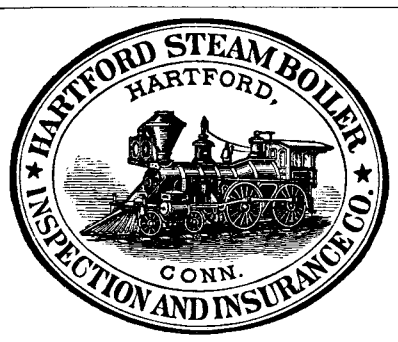

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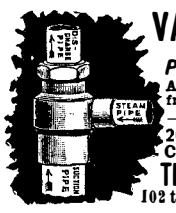

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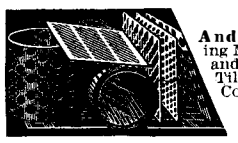

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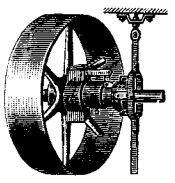

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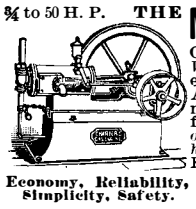

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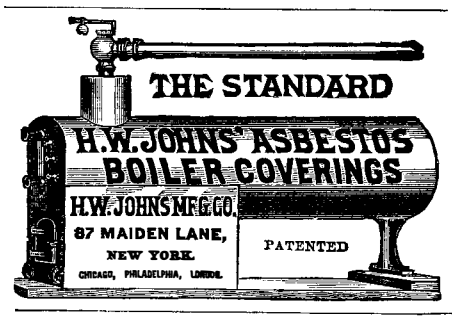

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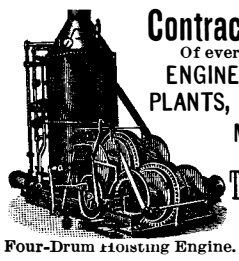

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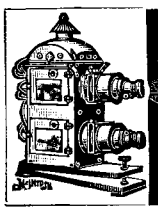

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